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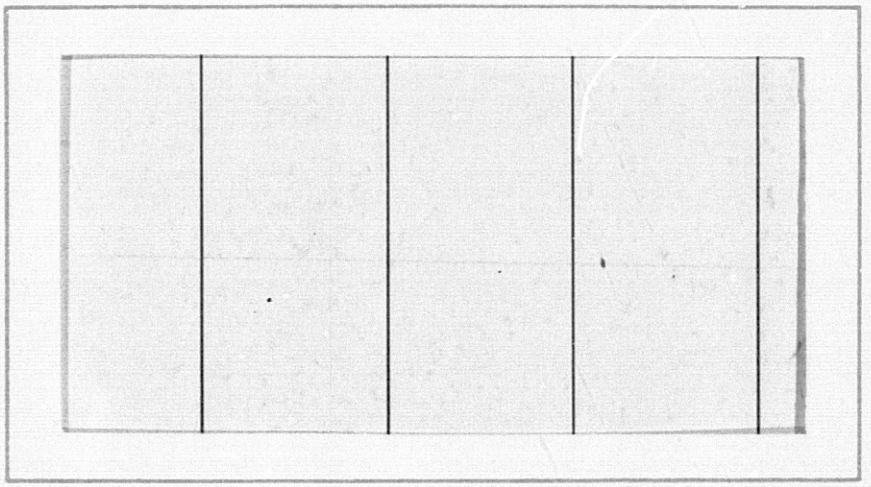
EX

VOL V



(NASA-CR-143970) TRACK/TRAIN DYNAMICS TEST REPORT TRANSFER FUNCTION TEST. VOLUME 4: DATA BOOK, x-AXIS TESTS, ACTUATORS 180 DEG OUT OF PHASE. RUN 30. z-AXIS TESTS, SINGLE ACTUATOR. RUN 46 (Martin Marietta Corp.) G3/37

N75-33404

Unclas
42663

MARTIN MARIETTA

POST OFFICE BOX 179, DENVER, COLORADO 80201

OCT 1975
RECEIVED
NASA STI FACILITY
INPUT BRANCH

TR-005-TF

30 May 1975

TRACK/TRAIN DYNAMICS

TEST REPORT

TRANSFER FUNCTION TEST

Volume IV

Data Book

X-Axis Tests

Actuators 180° Out of Phase

Run 30

Z-Axis Tests

Single Actuator

Run 46

TABLE I. DATA INDEX - VOLUME IV

MEAS. NO.	XDCR SENSITIVITY	RUN NUMBER VS PAGE NUMBER			
		RUN 30	RUN 46		
FL3/OSC	15K#/V / 1/.651V	pp. 9	pp. 81	(FV1/OSC.)	
FL4	↓	10			
FL4/FL3	15K#/V / 15K#/V	11			
FV2	20K#/V / 15K#/V	12	82	(FV2/FV1)	NOTE: FV1 is the reference measurement for Run 46
FV4	↓	13	83		
DV1	0.5"/V / 15K#/V	14 15	84		
DV2	↓	16	85 86		
DV3		17 18	87		
DV4	↓	19 20	88		
AV1	1Gp/V / 15K#/V	21	89		
AV2	↓	22	90 91		
AV3		23 24	92		
AV4		25 26	93		
AV5		27 28	94		
AV6		29 30	95		
AL1		31 32 33	96		
AL2		34 35	97		
AL3		36	98		
AL6		37 38	99		
AL7		39 40	100		
AL11	↓	41 42	101		
P	3.5Kpsi/V / 15K#/V	43			
AL4	1Gp/V / 15K#/V	44 45	102		
AL5	↓	46 47	103		
AL8		48 49	104		
AL9		50 51	105		
AL10		52 53	106		
AL12	↓	54	107		
DL1	0.5"/V / 15K#/V	55 56	108		
DL2	↓	57	109		
DL3		58	110		
DL4		59 60	111		
DL5		61	112 113		
DL6		62 63	114		
DL7		64	115		
DL8		65	116		
DL9	↓	66	117		

TABLE I. DATA INDEX - VOLUME IV

MEAS. NO.	XDCR SENSITIVITY	RUN NUMBER VS PAGE NUMBER	
		RUN 30	RUN 46
DL10/FL1	0.5"/V 15K#/V	pp. 67	pp.118
DL11		68	119
DL12		69 70	120 121
DL13		71 72	122
DL14		73	123
DL15		74 75	124
DL16		76	125
DL17		77	126 127

VOLUME IV

RUN 30 TEST DATA

X-AXIS, 6010 POUND/ACTUATOR TEST LEVEL,
ACTUATORS 180° OUT OF PHASE

```
   1 HEADING: TRAIN TRACK TRANS 6010LB  LONG. OUT PH. 3/26/75

SWEEP PARMETERS:
   2 MODE  1=LOG, 0=LIN:     1.
   3 TYPE  1=UNI-DIRECTIONAL, 0=BI-DIRECTIONAL:     1.
   4 START, END FREQ, HZ:      .5      50.
FREQ RANGE -- OCTAVES, DECADES:     6.644     2.
   5 SPECIFICATION  1=RATE, 0=DUPATION:     1.
   6 UNITS  1=OCT/MIN, 0=DEC/MIN:     1.
   7 RATE, OCT/MIN:     2.
SWEEP DURATION -- MIN, SEC:     3.       19.

TEST LENGTH:
   8 SPECIFICATION  1=TIME, 0=SWEEP CYCLES:     0.
   9 CYCLES:     1.
TEST TIME -- HRS, MIN, SEC:     0.       3.       19.

START-UP AND SHUT-DOWN:
  10 START-UP TIME, SEC:   120.
  11 SHUT-DOWN TIME, SEC:      .5

VIBRATION LIMITS (P-P):
  12 DISPLACEMENT, IN: 5000.
  13 VELOCITY, IN/SEC: 9999.
  14 ACCELERATION, G:  450.

REFERENCE CONTROL SPECTRUM:
  15 TYPE, VALUE, FREQ, ABORT LIMIT: 2.     40.         .5       7.
  16 TYPE, VALUE, FREQ, ABORT LIMIT: 3.     60.        1.3       6.
  17 TYPE, VALUE, FREQ, ABORT LIMIT: 2.     60.       50.        4.
  18 TEST LEVEL (DB BELOW REF):     3.5

ACCELERATION SIGNALS:
  19 NR OF SIGNALS:     2.
     CHANNEL NRS:     1.        2.
  20 1=PEAK, 0=RMS:     0.
  21 SENSITIVITY, MV/G:    20.
  22 STRATEGY  1=MAX, 0=AVG:     1.

LIMIT SIGNALS:
  23 NR OF SIGNALS:     0.

ABORT LINES:
  24 NR OF LINES:     0.
ALARM LINES:
  25 NR OF LINES:     0.
  26 1=DUAL-CHANNEL A/D, 0=ACE:     1.
  27 COMPRESSION SPEED  2=HIGH, 1=NORMAL, 0=LOW:     1.
```

TRK TRN TRANS FUNCT TEST 6010LB X-AXIS 3/26/75

COMPLETION STATUS: ABORTED DURING SWEEP 1 AT 36.99 HZ.
MAXIMUM DRIVE LIMIT.

TEST DURATION -- HRS, MIN, SEC: 0 3 6

MAX ABS CONTROL ERROR: 3.6 DB AT 19.42 HZ.
AVG ABS CONTROL ERROR: .5133 DB.

CONTROL CHANNEL	FREQ RANGE (HZ)		
SWEEP 1			
1	.5	--	.5
2	.5	--	1.341
1	1.341	--	12.98
2	12.98	--	13.06
1	13.06	--	13.34
2	13.34	--	13.39
1	13.39	--	14.48
2	14.48	--	14.59
1	14.59	--	15.35
2	15.35	--	15.58
1	15.58	--	16.29
2	16.29	--	16.55
1	16.55	--	17.03
2	17.03	--	17.13
1	17.13	--	18.
2	18.	--	18.1
1	18.1	--	18.17
2	18.17	--	18.23
1	18.23	--	18.49
2	18.49	--	18.52
1	18.52	--	18.8
2	18.8	--	18.84
1	18.84	--	18.99
2	18.99	--	19.03
1	19.03	--	19.24
2	19.24	--	19.52
1	19.52	--	19.76
2	19.76	--	19.8
1	19.8	--	19.91
2	19.91	--	19.95
1	19.95	--	20.95
2	20.95	--	21.
1	21.	--	21.08
2	21.08	--	21.12
1	21.12	--	21.19
2	21.19	--	21.2
1	21.2	--	21.22
2	21.22	--	21.26
1	21.26	--	21.36
2	21.36	--	21.4
1	21.4	--	21.9
2	21.9	--	21.92
1	21.92	--	22.2
2	22.2	--	22.24
1	22.24	--	22.27
2	22.27	--	22.3

CONTINUED

POST-TEST DOCUMENTATION (CONTINUED)

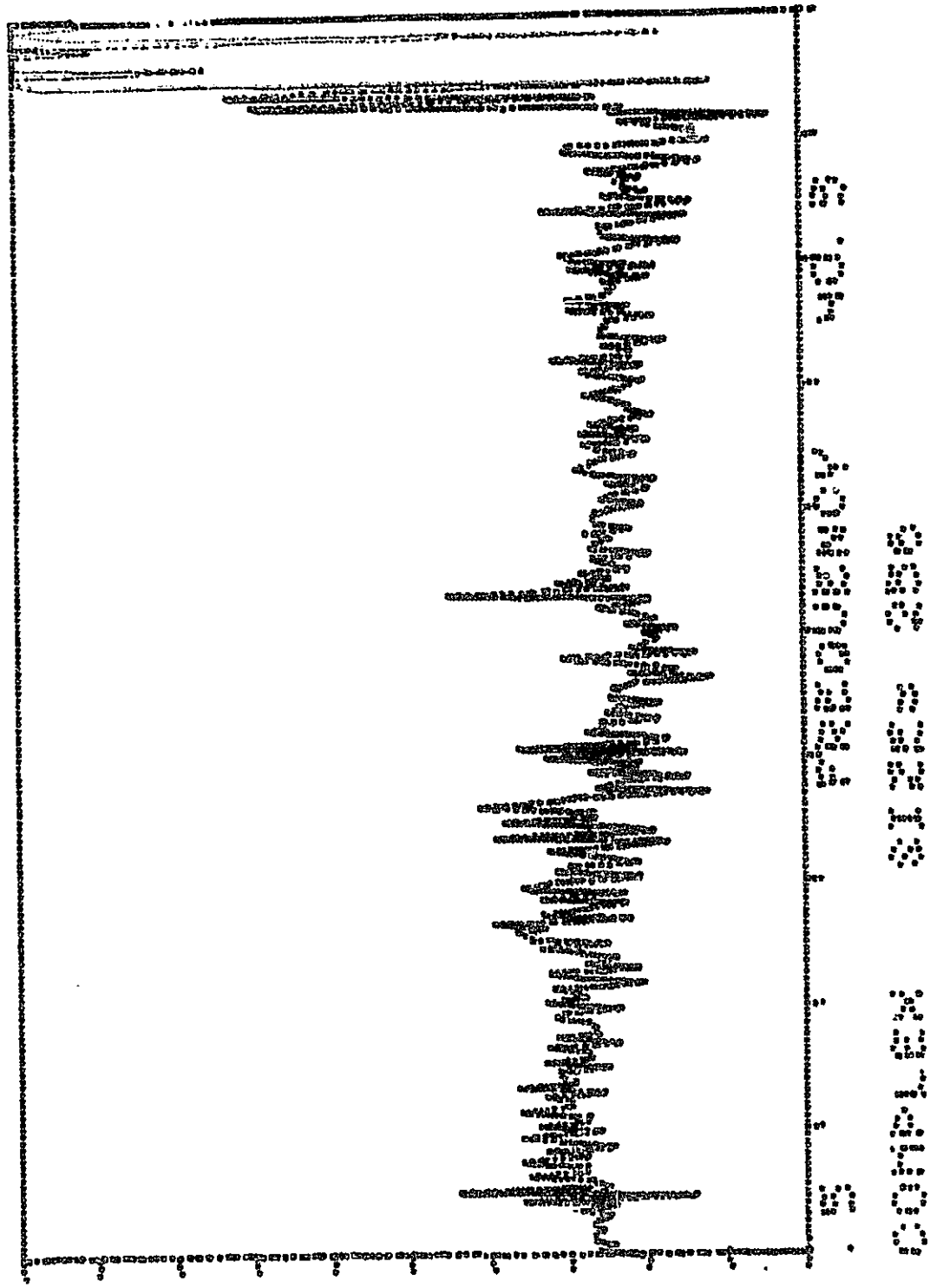
1	22.3	--	22.45
2	22.45	--	22.47
1	22.47	--	22.6
2	22.6	--	22.62
1	22.62	--	22.64
2	22.64	--	22.7
1	22.7	--	22.74
2	22.74	--	22.79
1	22.79	--	22.91
2	22.91	--	22.93
1	22.93	--	23.08
2	23.08	--	23.12
1	23.12	--	23.27
2	23.27	--	23.43
1	23.43	--	24.95
2	24.95	--	24.97
1	24.97	--	25.06
2	25.06	--	25.15
1	25.15	--	25.32
2	25.32	--	25.39
1	25.39	--	25.48
2	25.48	--	25.51
1	25.51	--	25.58
2	25.58	--	25.62
1	25.62	--	25.71
2	25.71	--	25.91
1	25.91	--	25.94
2	25.94	--	26.15
1	26.15	--	26.17
2	26.17	--	26.2
1	26.2	--	26.44
2	26.44	--	26.57
1	26.57	--	26.63
2	26.63	--	26.71
1	26.71	--	26.86
2	26.86	--	26.9
1	26.9	--	27.05
2	27.05	--	27.13
1	27.13	--	27.26
2	27.26	--	27.34
1	27.34	--	27.36
2	27.36	--	27.44
1	27.44	--	27.46
2	27.46	--	27.51
1	27.51	--	27.79
2	27.79	--	27.84
1	27.84	--	27.92
2	27.92	--	28.07
1	28.07	--	28.13
2	28.13	--	28.28
1	28.28	--	28.41
2	28.41	--	28.52
1	28.52	--	28.68
2	28.68	--	28.81
1	28.81	--	28.86
2	28.86	--	28.97
1	28.97	--	29.11
2	29.11	--	29.22
1	29.22	--	29.45
2	29.45	--	29.49
1	29.49	--	29.6
2	29.6	--	29.71

CONTINUED

POST-TEST DOCUMENTATION (CONTINUED)

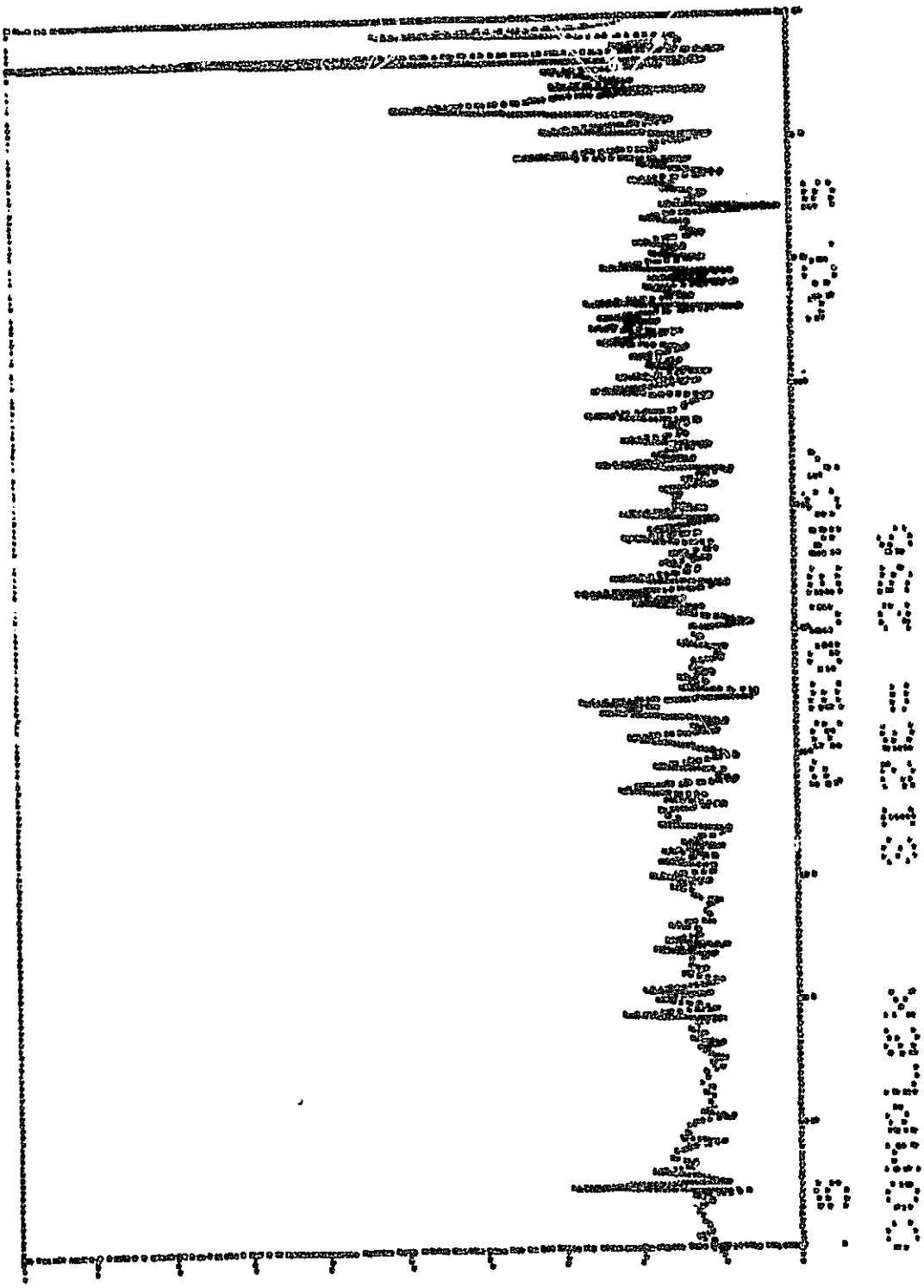
1	29.71	--	29.86
2	29.86	--	29.98
1	29.98	--	30.09
2	30.09	--	30.29
1	30.29	--	30.39
2	30.39	--	30.51
1	30.51	--	30.62
2	30.62	--	30.74
1	30.74	--	30.94
2	30.94	--	31.04
1	31.04	--	31.1
2	31.1	--	31.25
1	31.25	--	31.42
2	31.42	--	31.54
1	31.54	--	31.63
2	31.63	--	31.75
1	31.75	--	31.93
2	31.93	--	32.04
1	32.04	--	32.17
2	32.17	--	32.35
1	32.35	--	32.47
2	32.47	--	32.58
1	32.58	--	32.77
2	32.77	--	32.86
1	32.86	--	33.04
2	33.04	--	33.16
1	33.16	--	33.37
2	33.37	--	33.44
1	33.44	--	33.62
2	33.62	--	33.85
1	33.85	--	33.88
2	33.88	--	34.07
1	34.07	--	34.25
2	34.25	--	34.32
1	34.32	--	34.51
2	34.51	--	34.67
1	34.67	--	34.83
2	34.83	--	34.99
1	34.99	--	35.15
2	35.15	--	35.31
1	35.31	--	35.48
2	35.48	--	35.64
1	35.64	--	35.77
2	35.77	--	35.87
1	35.87	--	35.9
2	35.9	--	35.94
1	35.94	--	36.2
2	36.2	--	36.51
1	36.51	--	36.57
2	36.57	--	36.61
1	36.61	--	36.75
2	36.75	--	36.85
1	36.85	--	36.99

FL3/OSC.



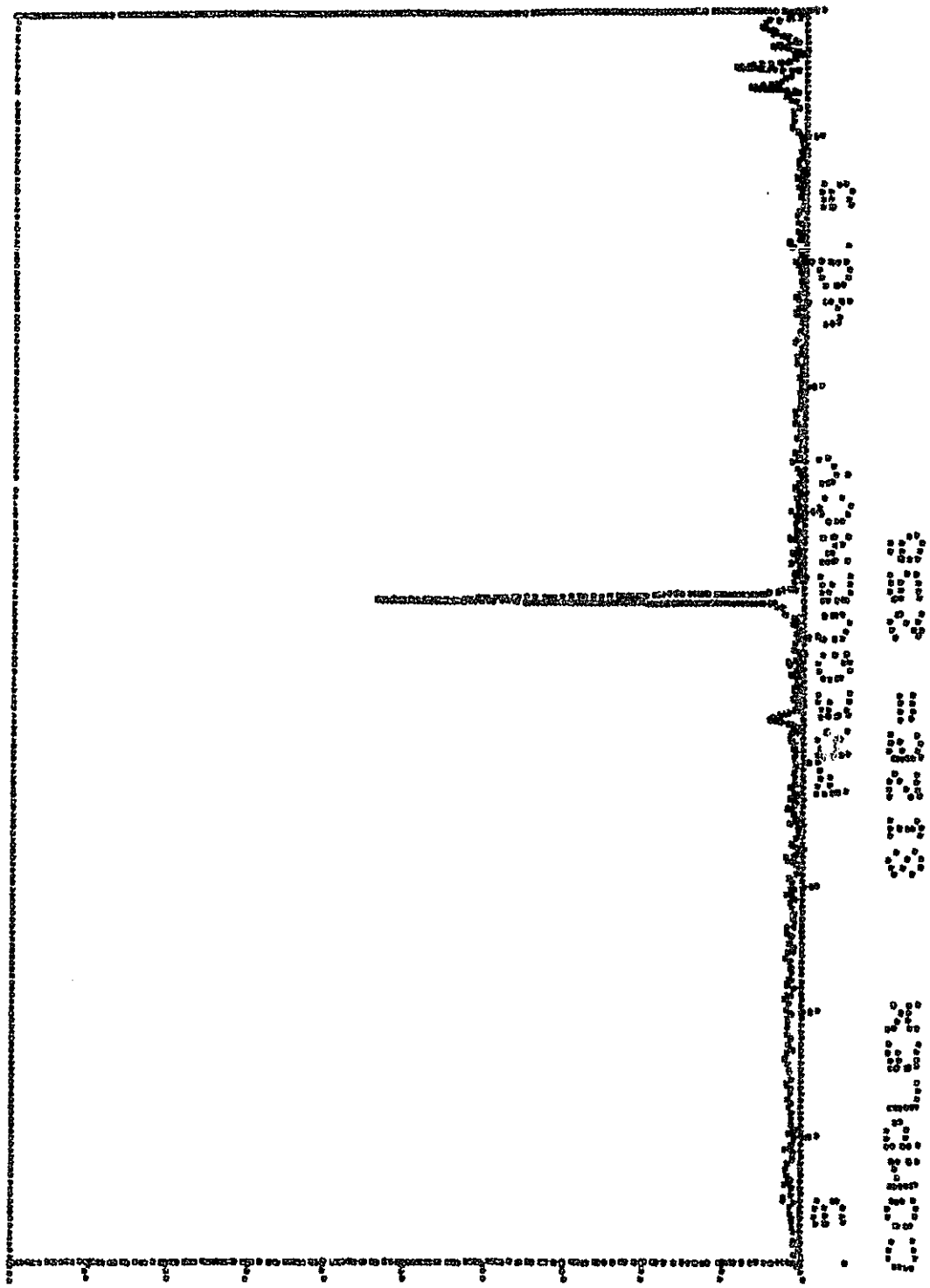
FL4/OSC.

FL4/FL3



FV2/FL3

FV4/FL3



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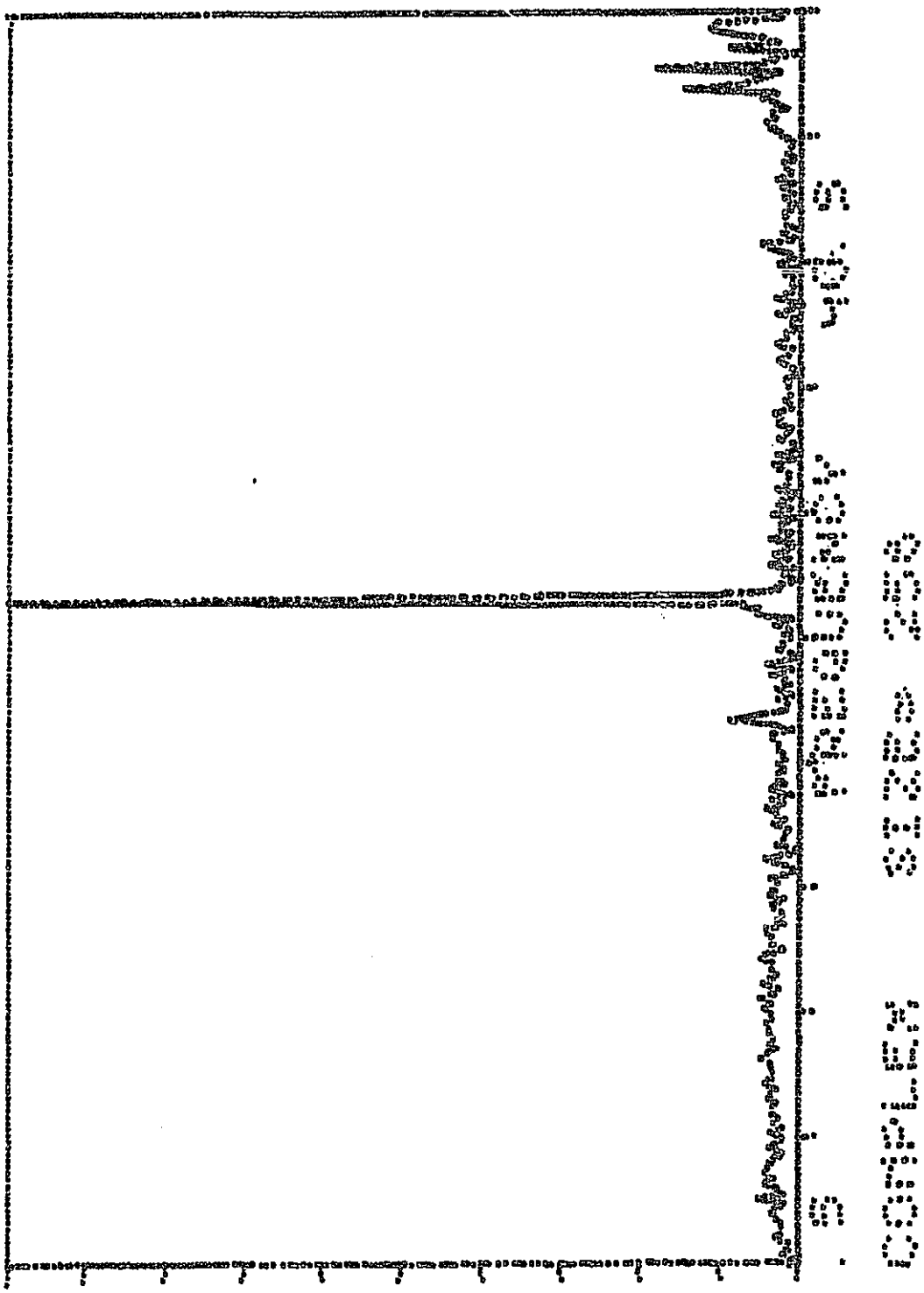
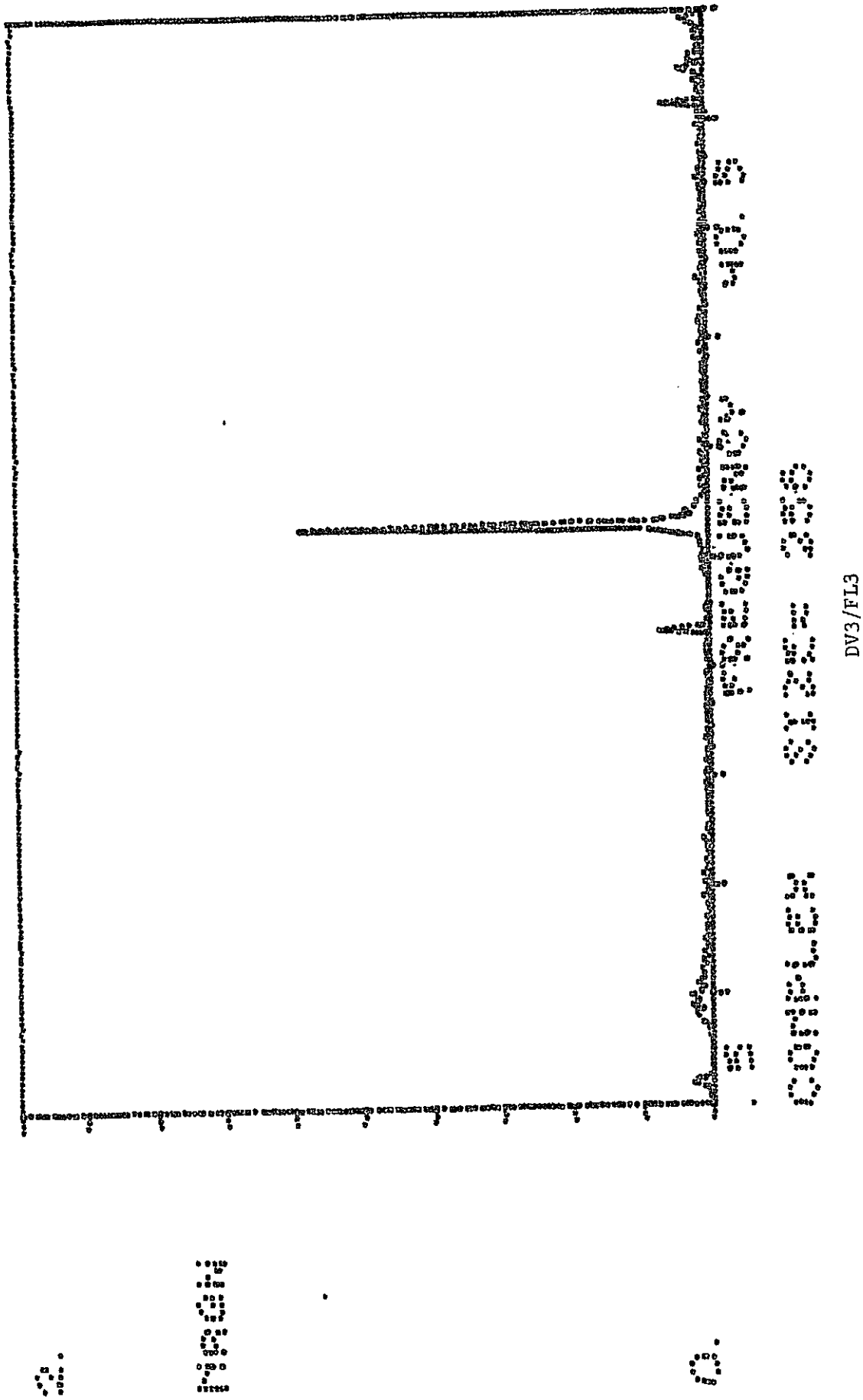


DV1/FL3

DV2/FL3



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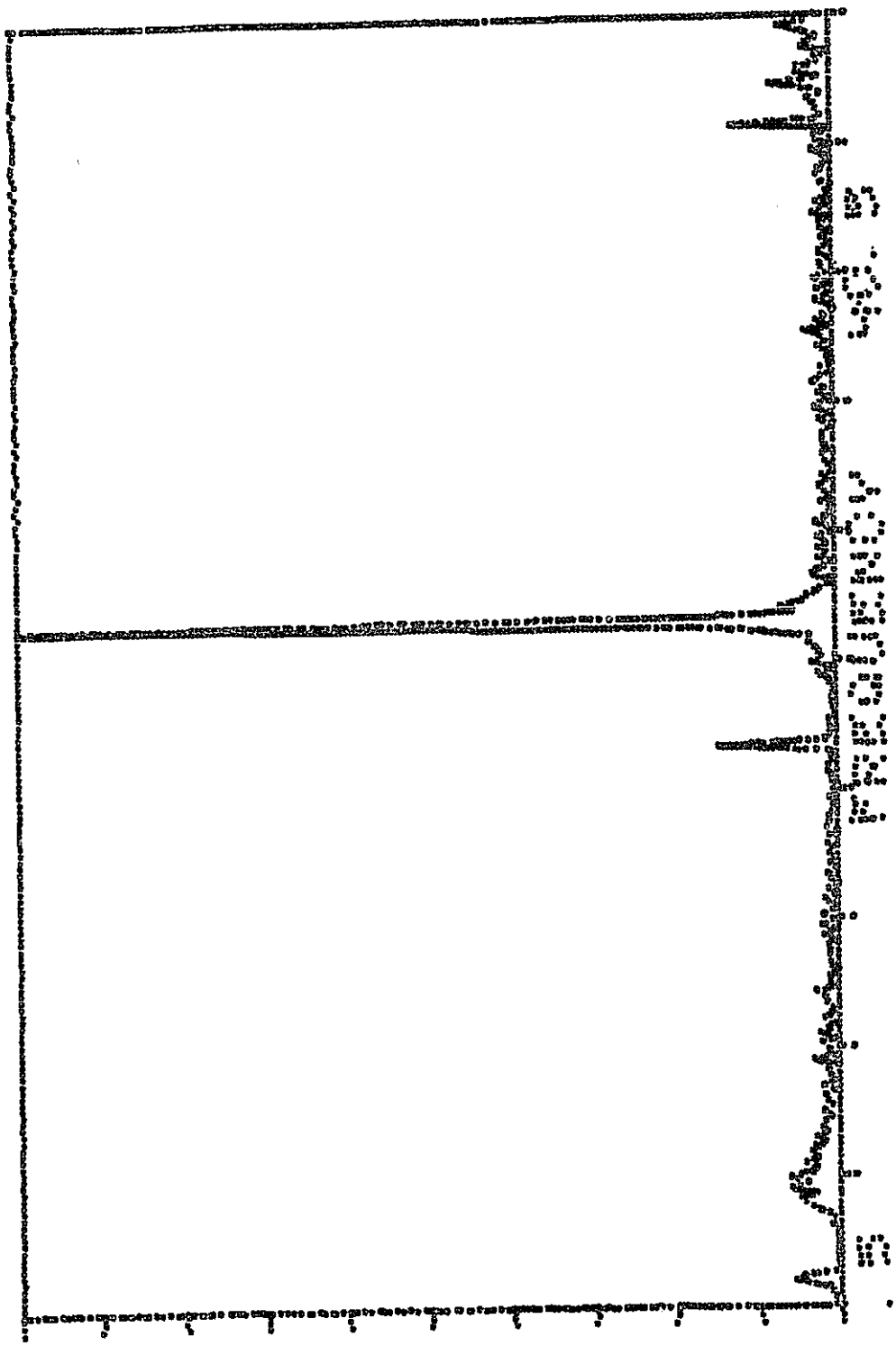

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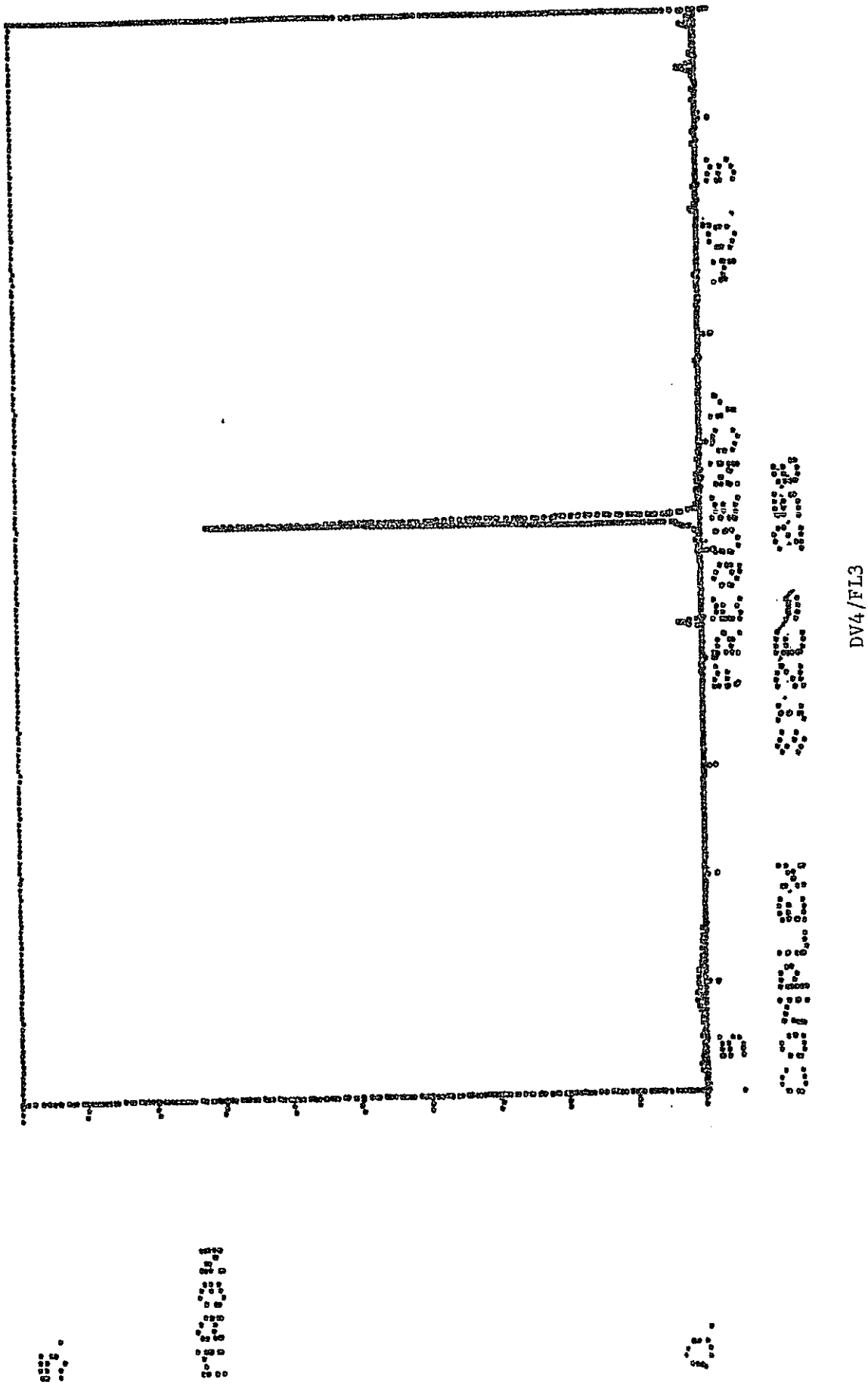

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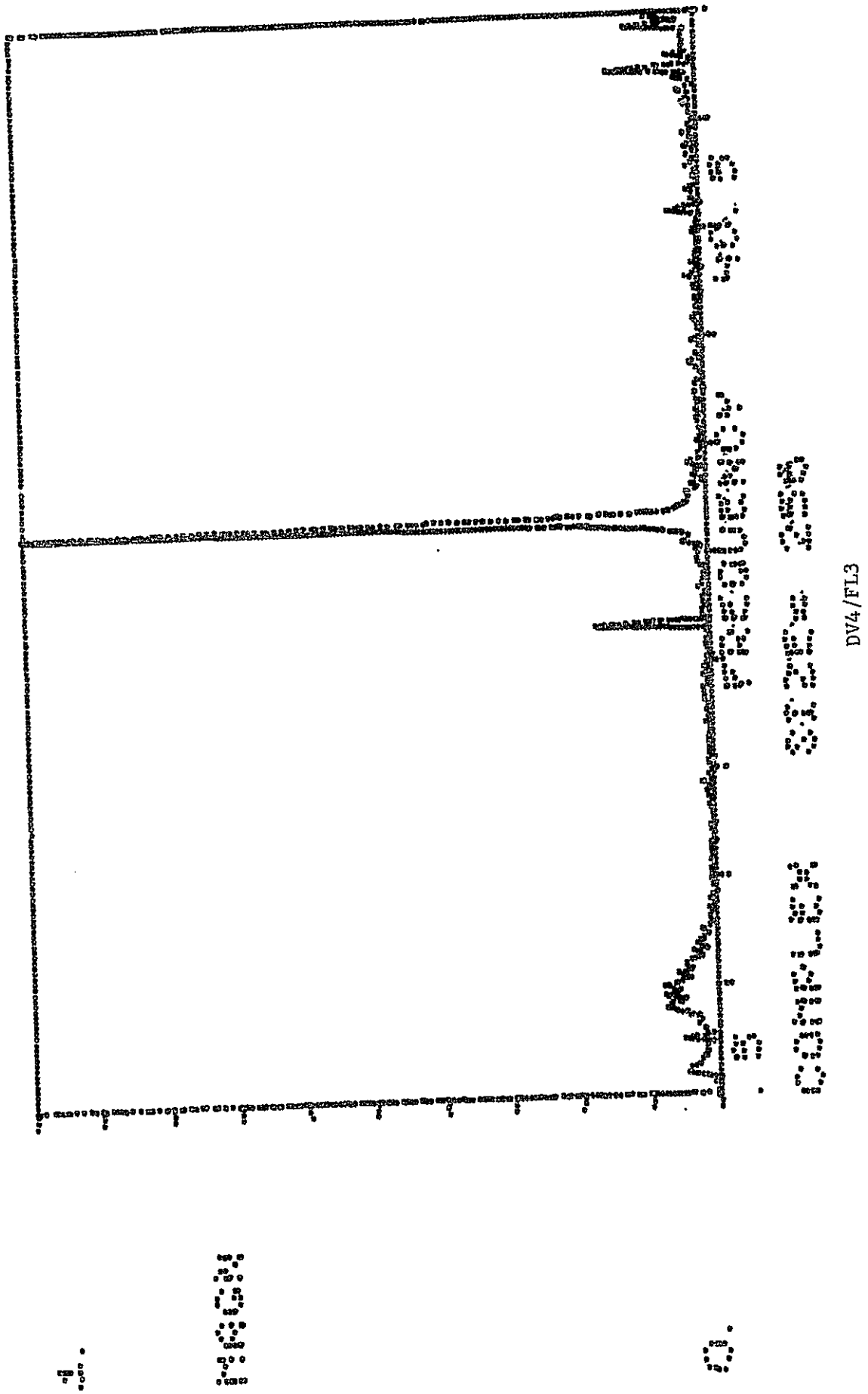

DV4/FL3

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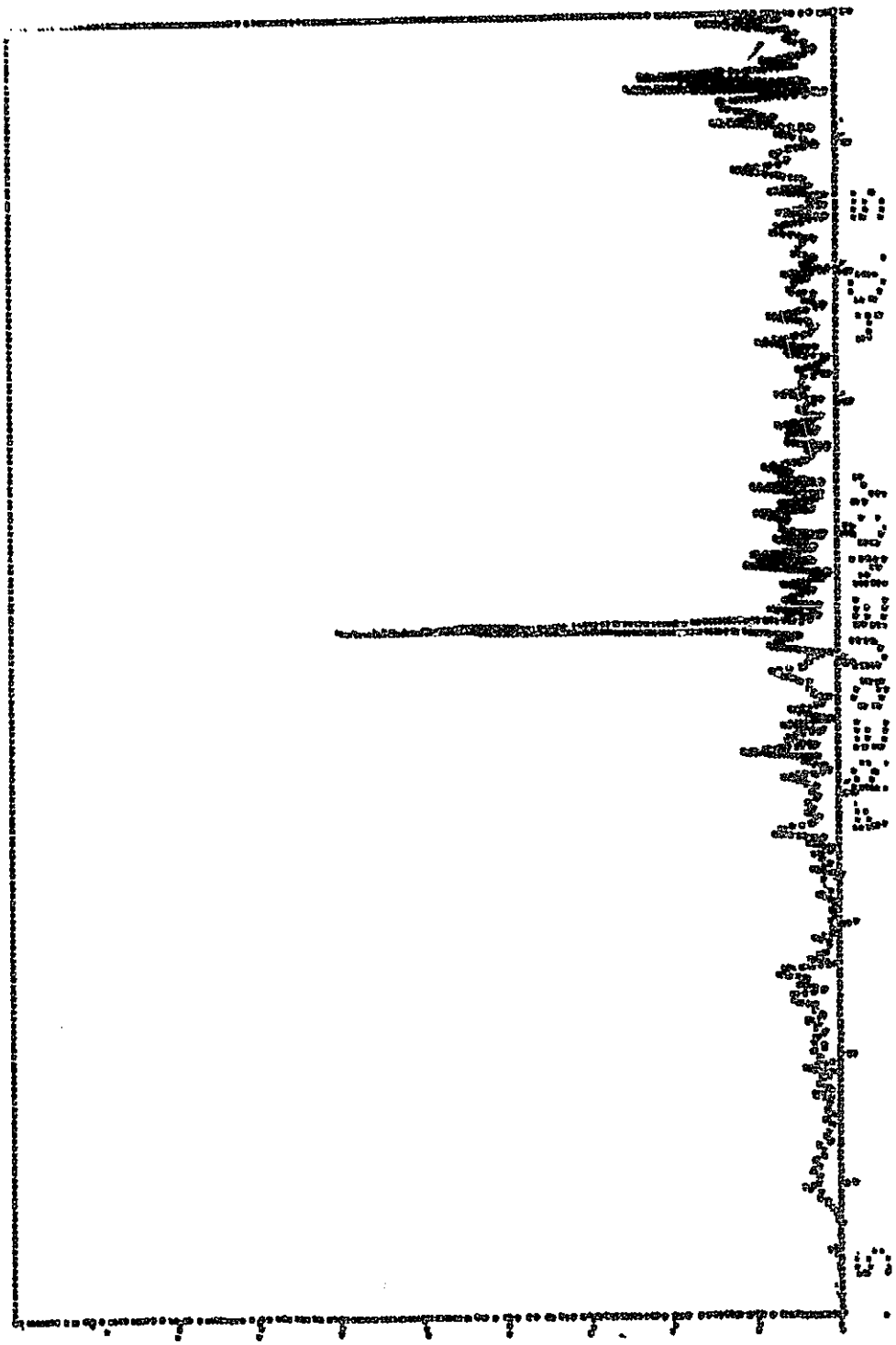
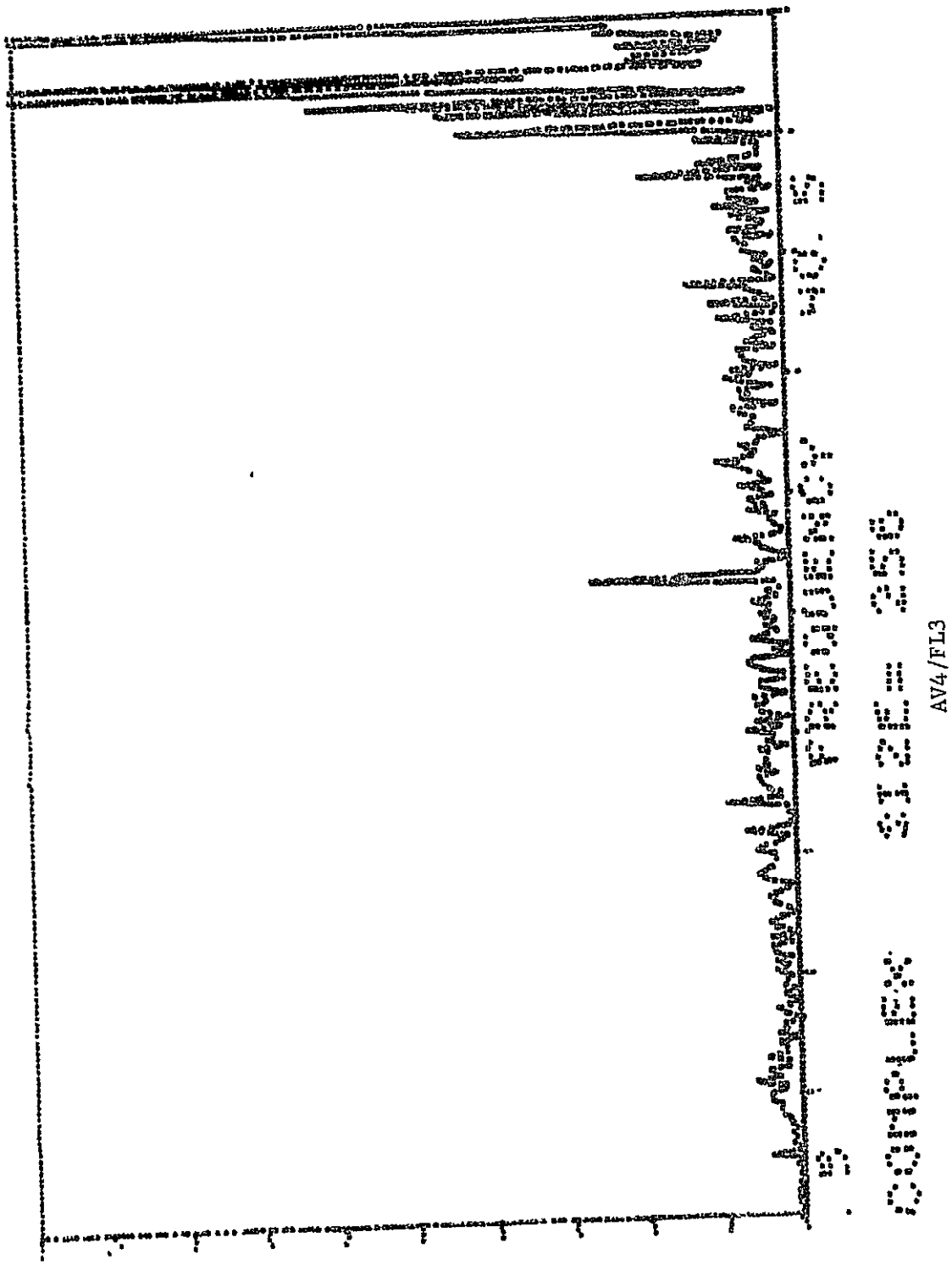


AV2/FL3

AV3/FL3

AV3/FL3



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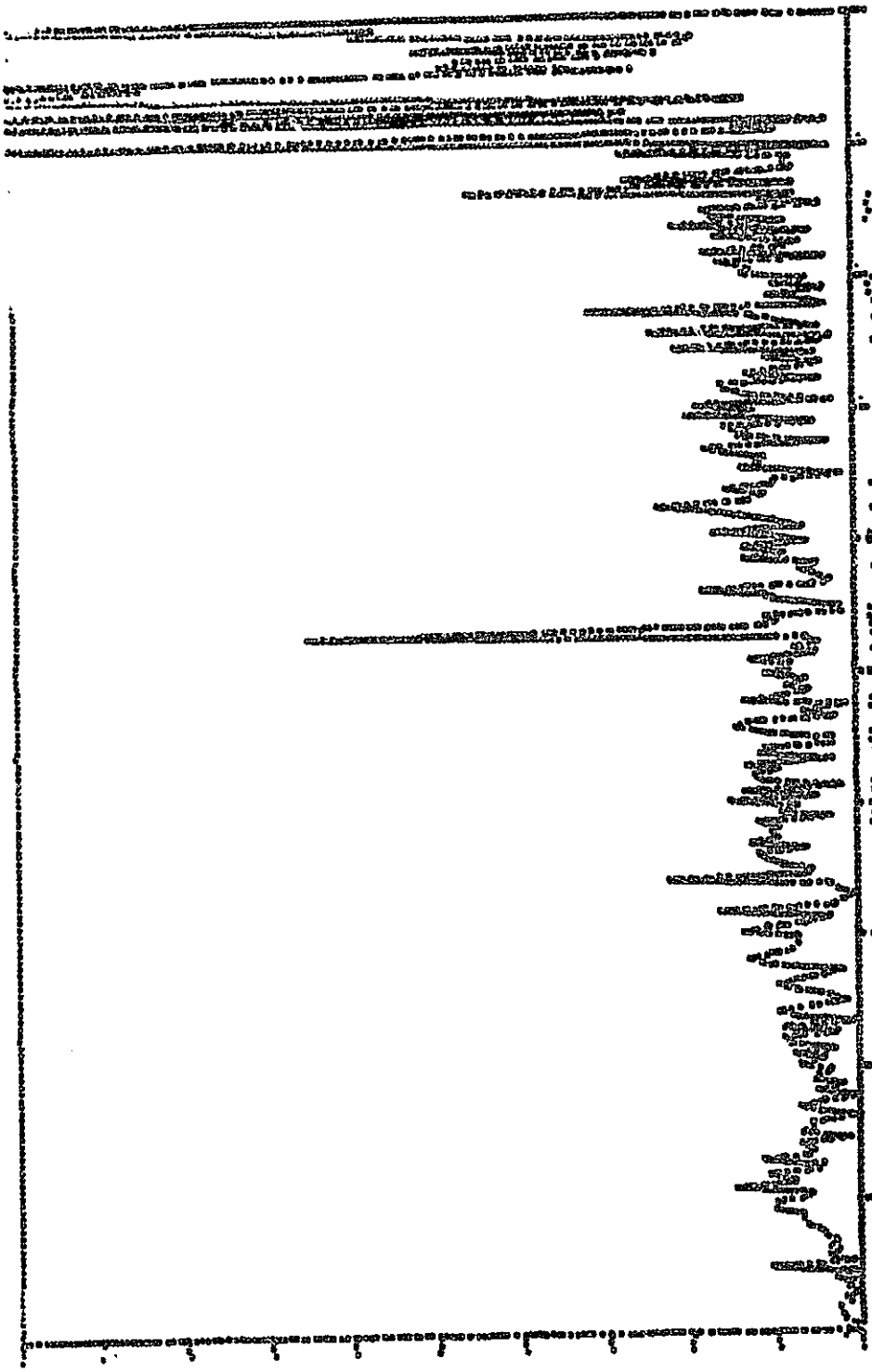

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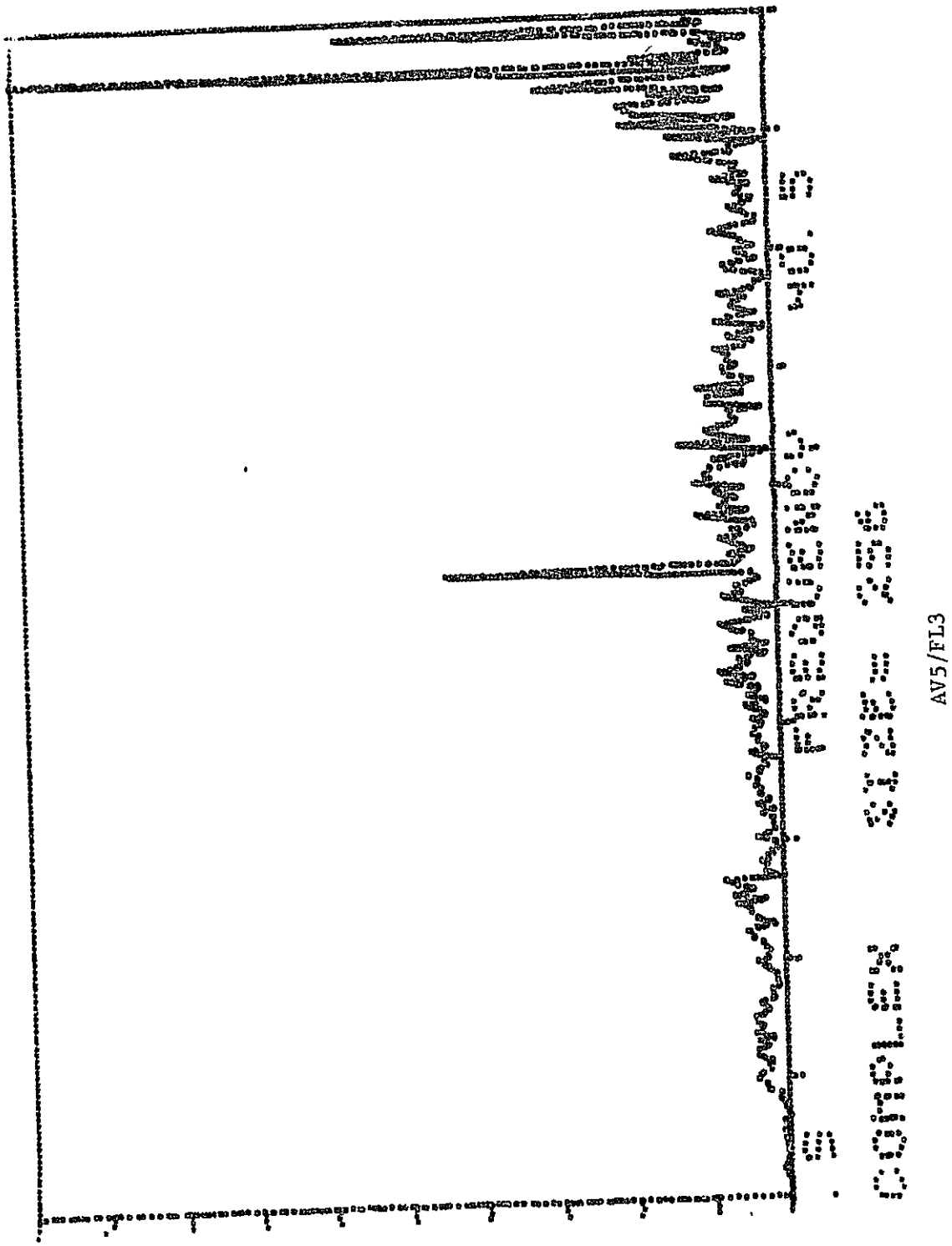

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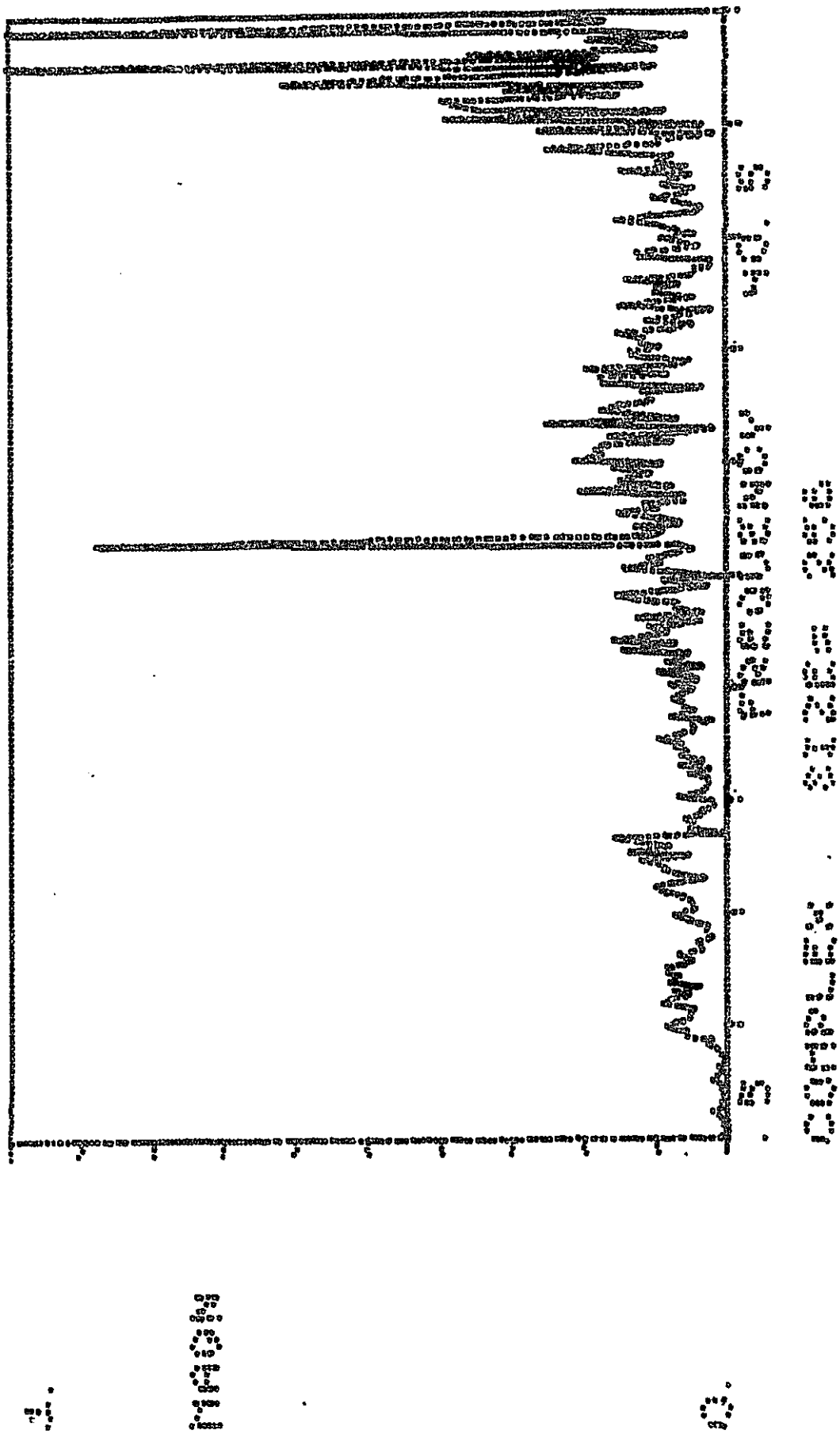

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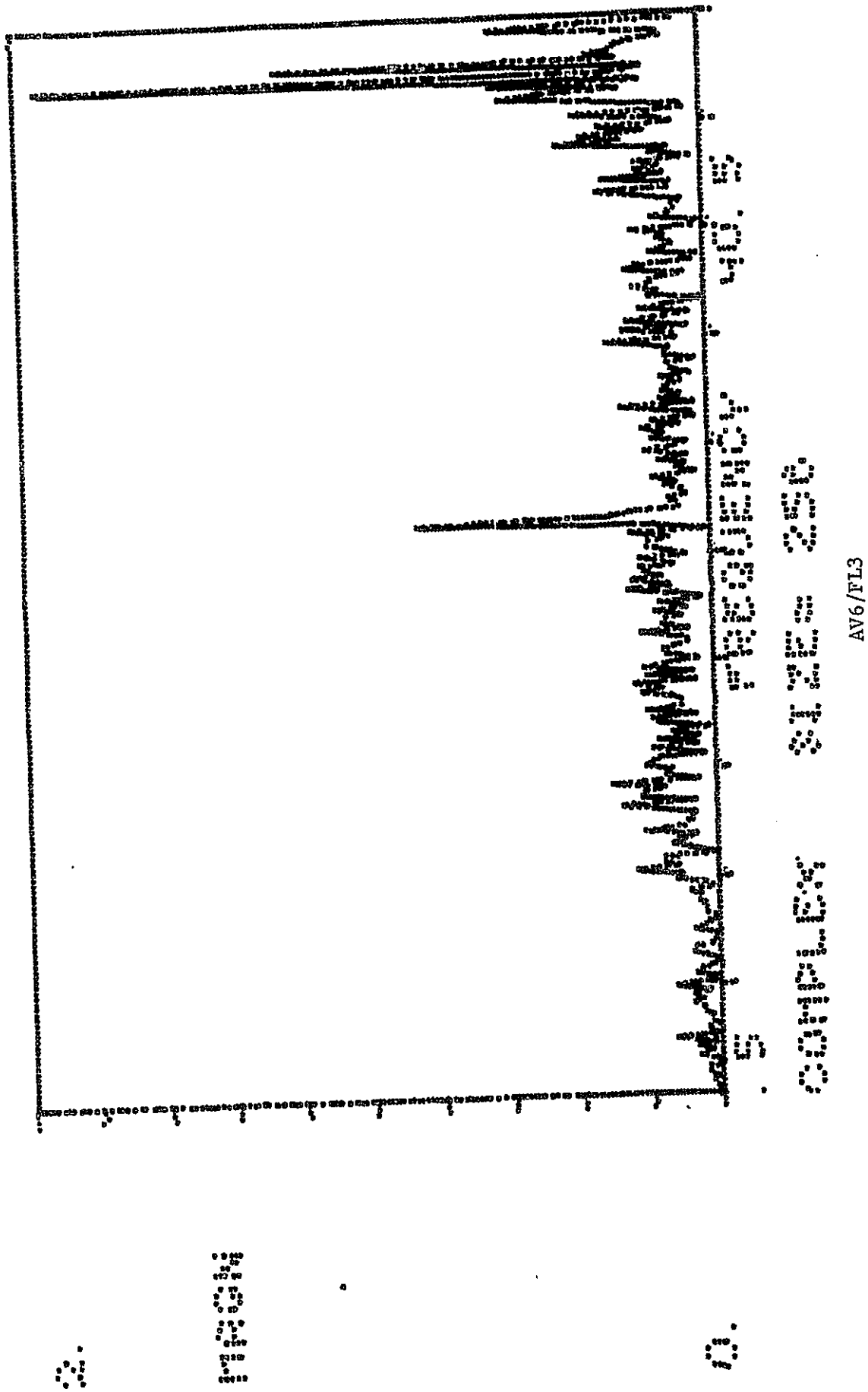

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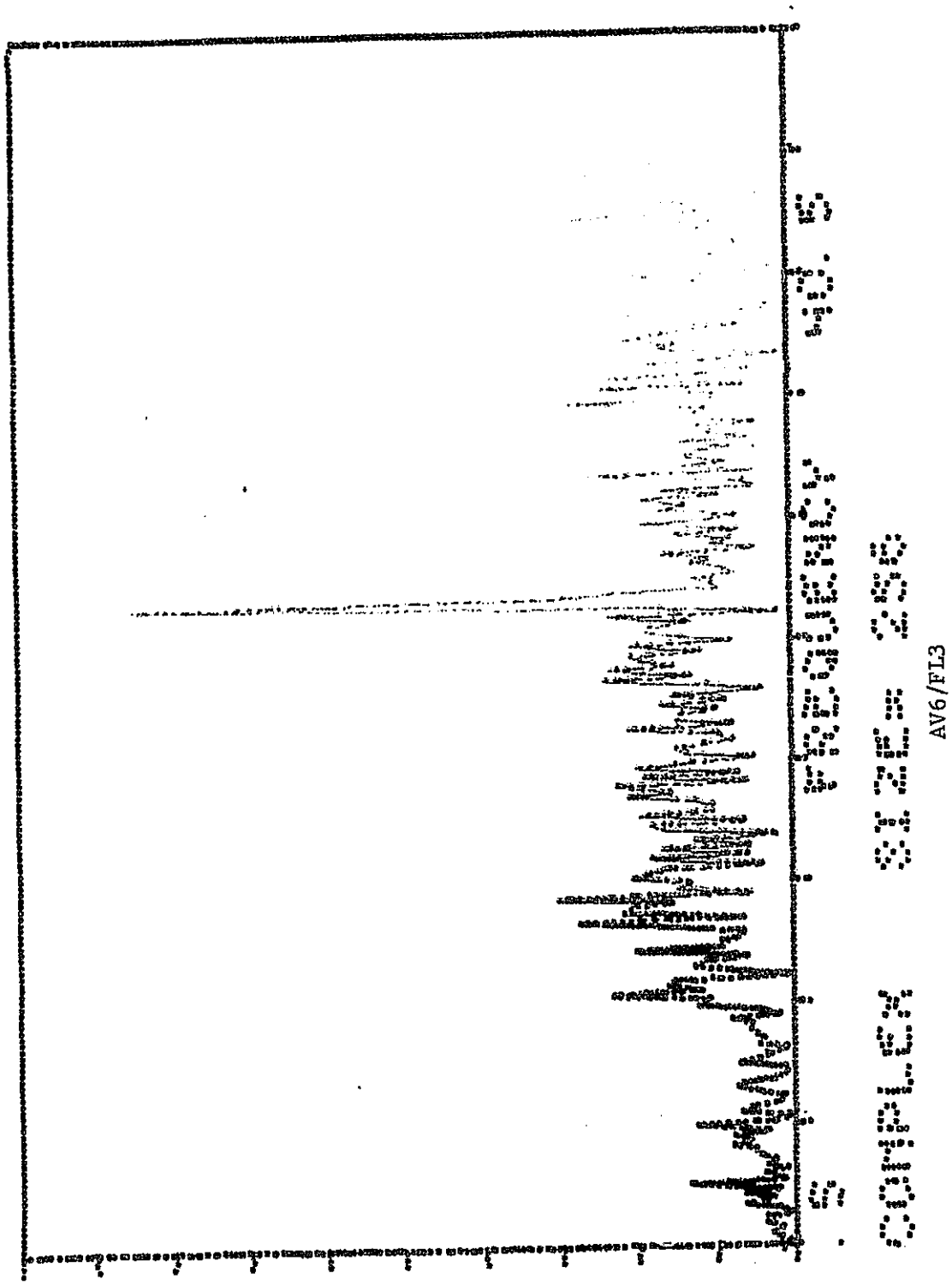


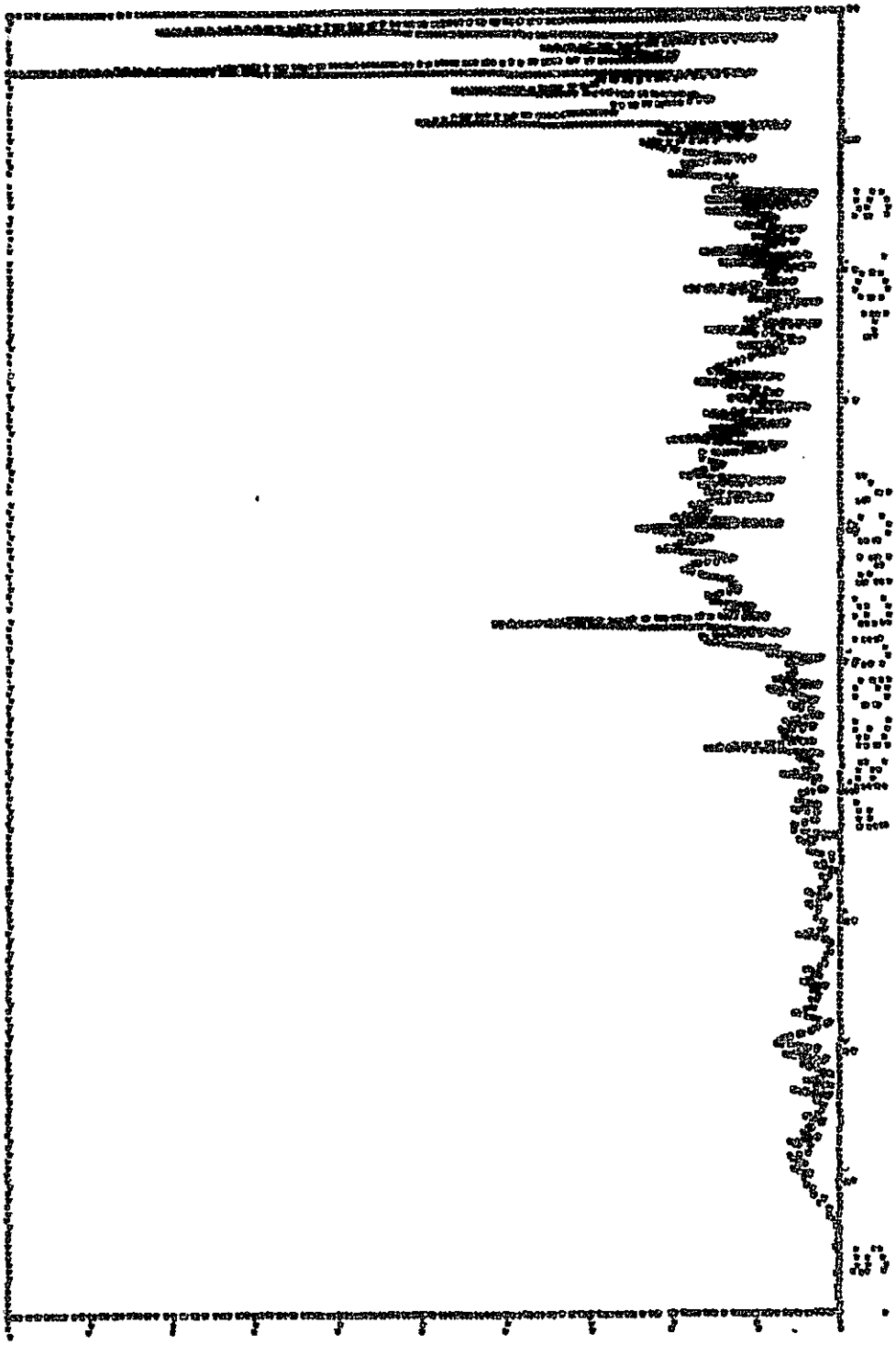
AV6/FL3

AL1/FL3

AL1/FL3

AL1/FL3

AL2/FL3



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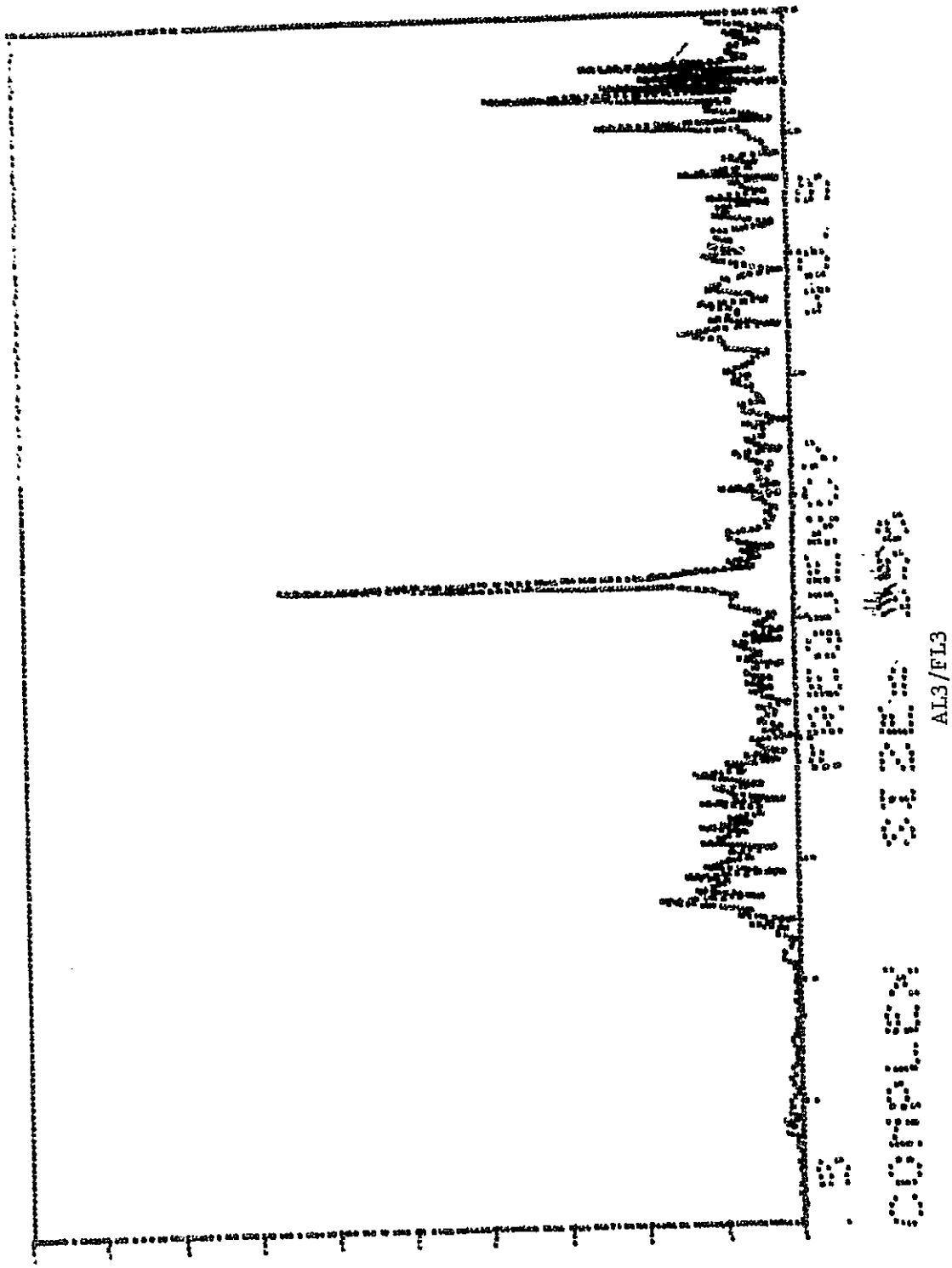
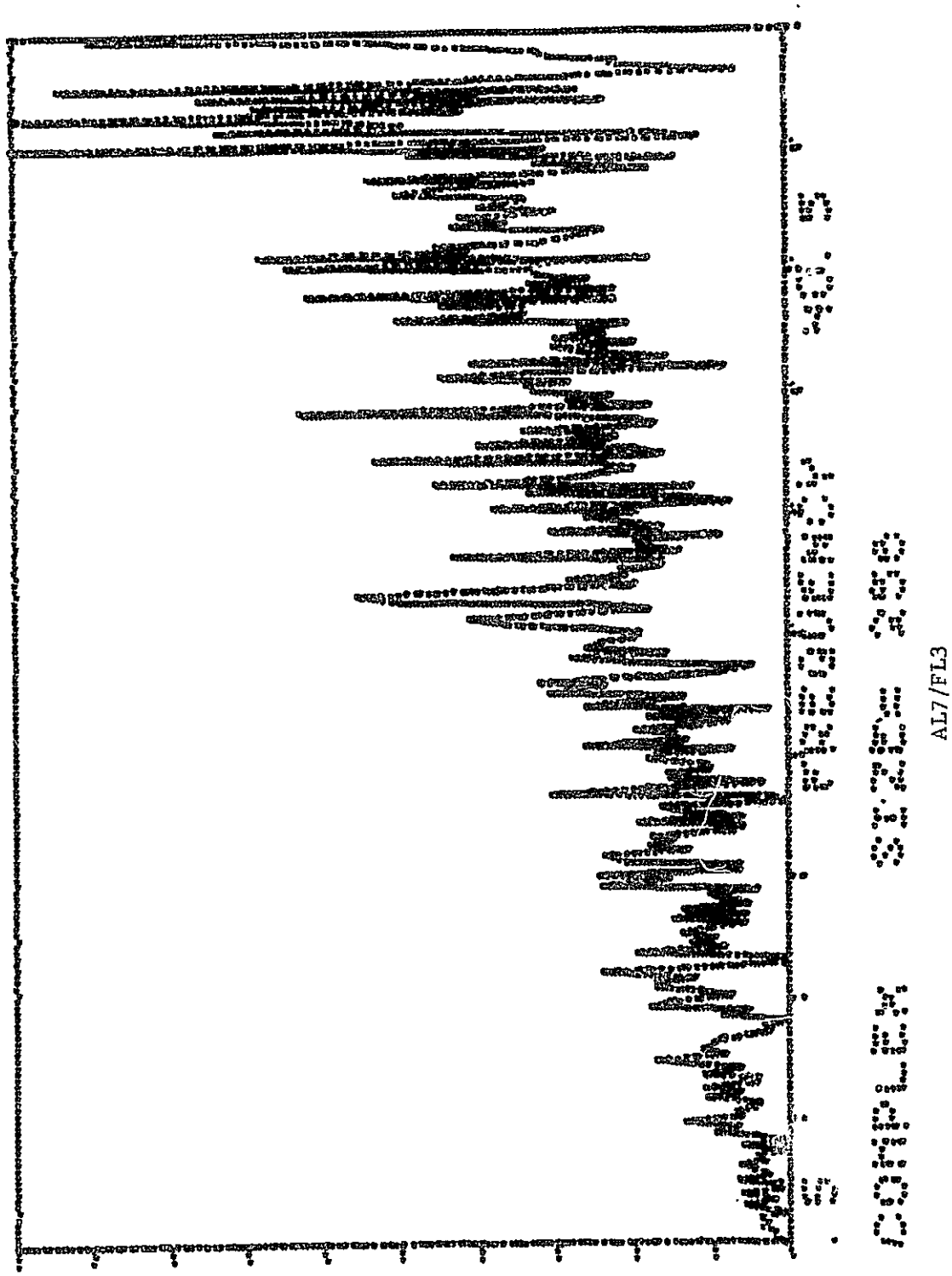


AL3/FL3

AL6/FL3

AL6/FL3

AL7/FL3



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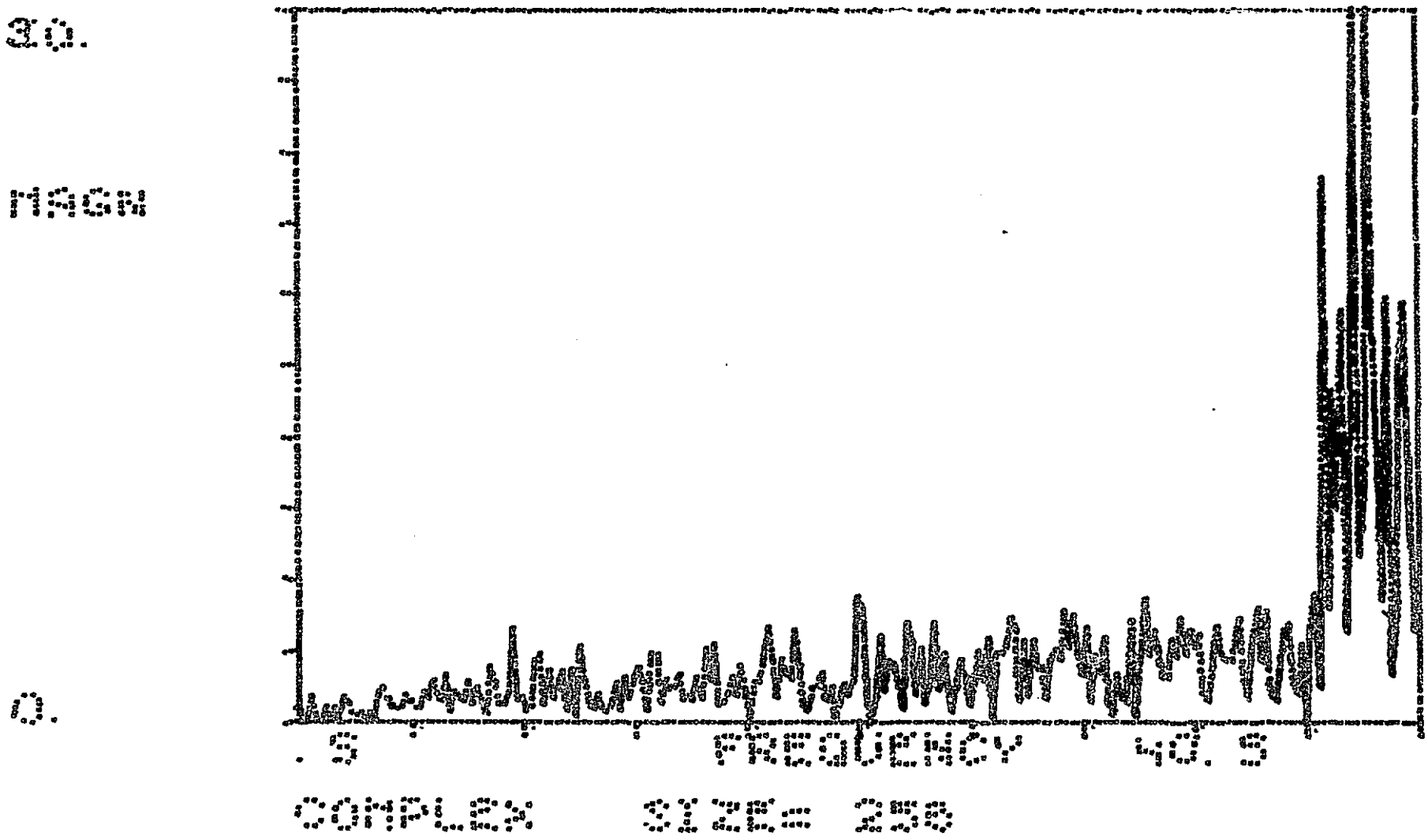

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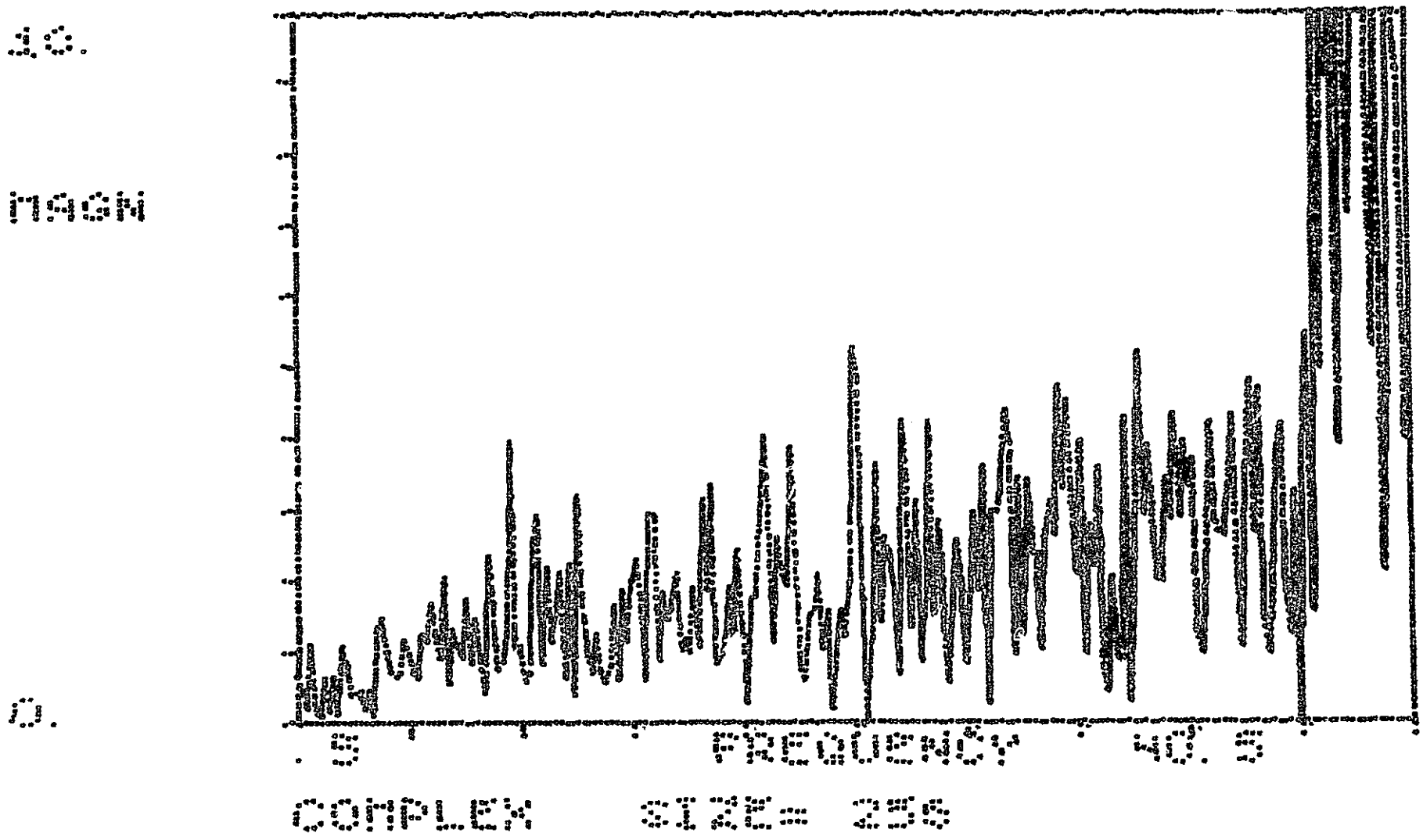


AL11/FL3

ΔP/FL3

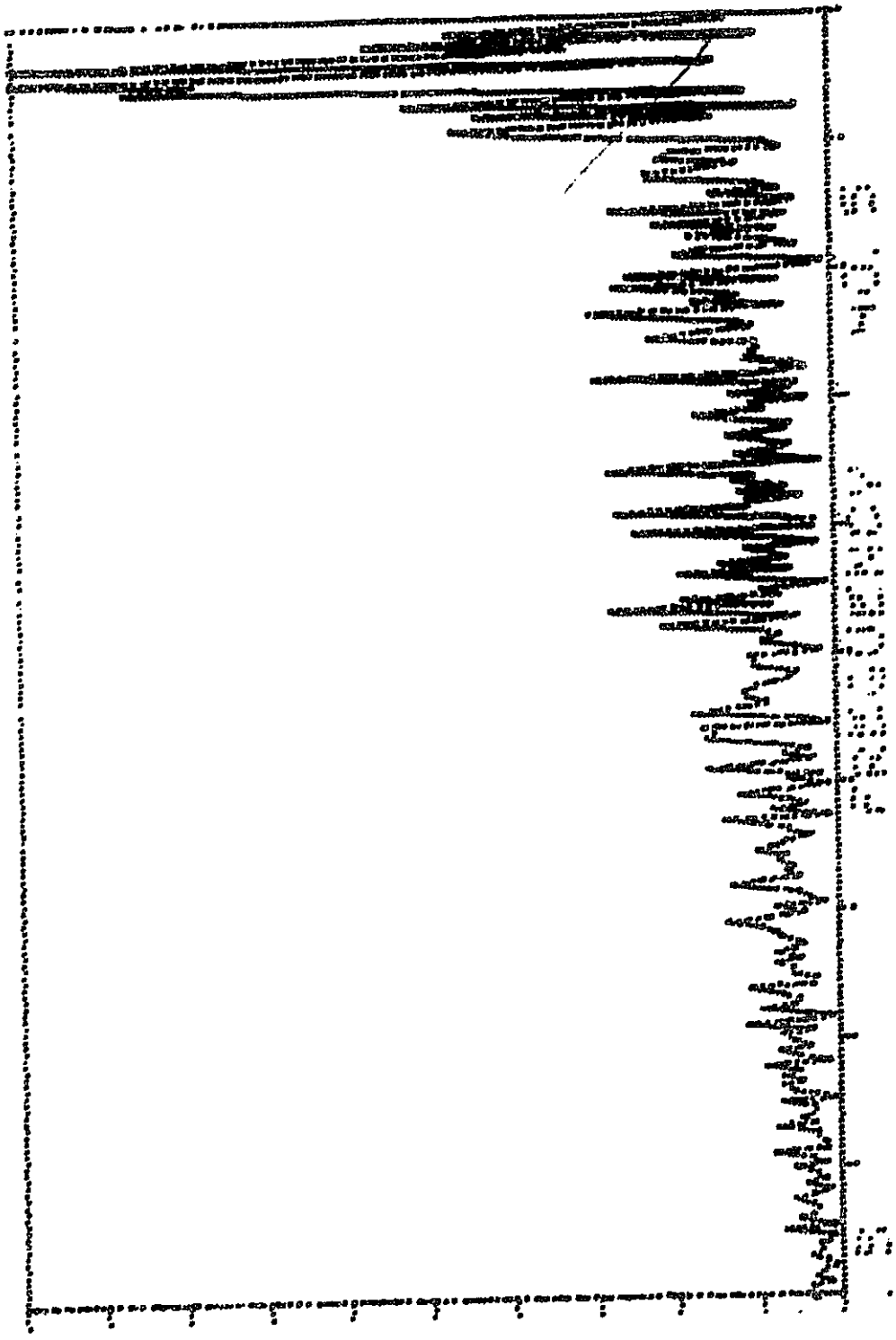
AL4/FL3

AL4/FL3

20.

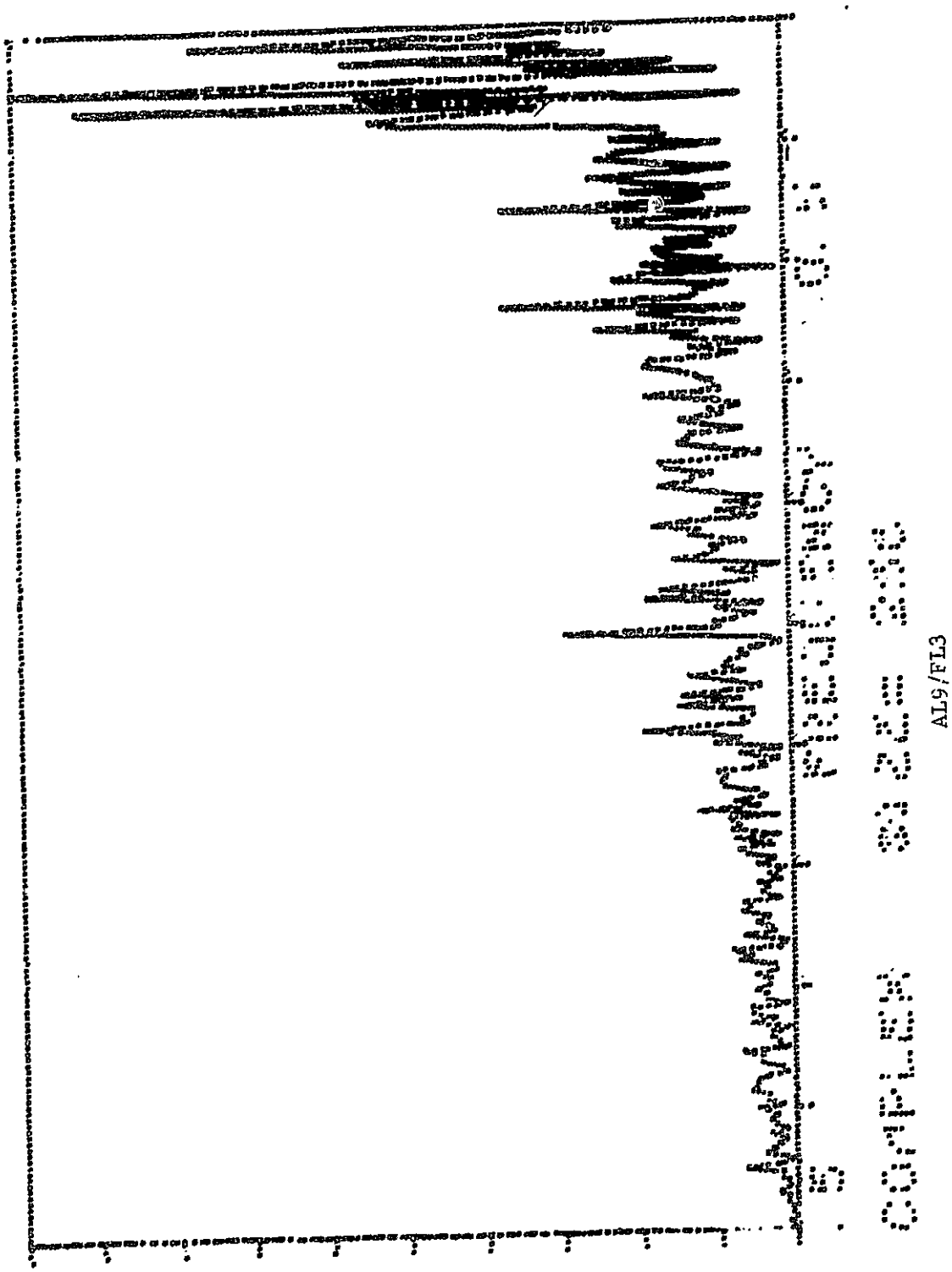
AL5/FL3

AL5/FL3

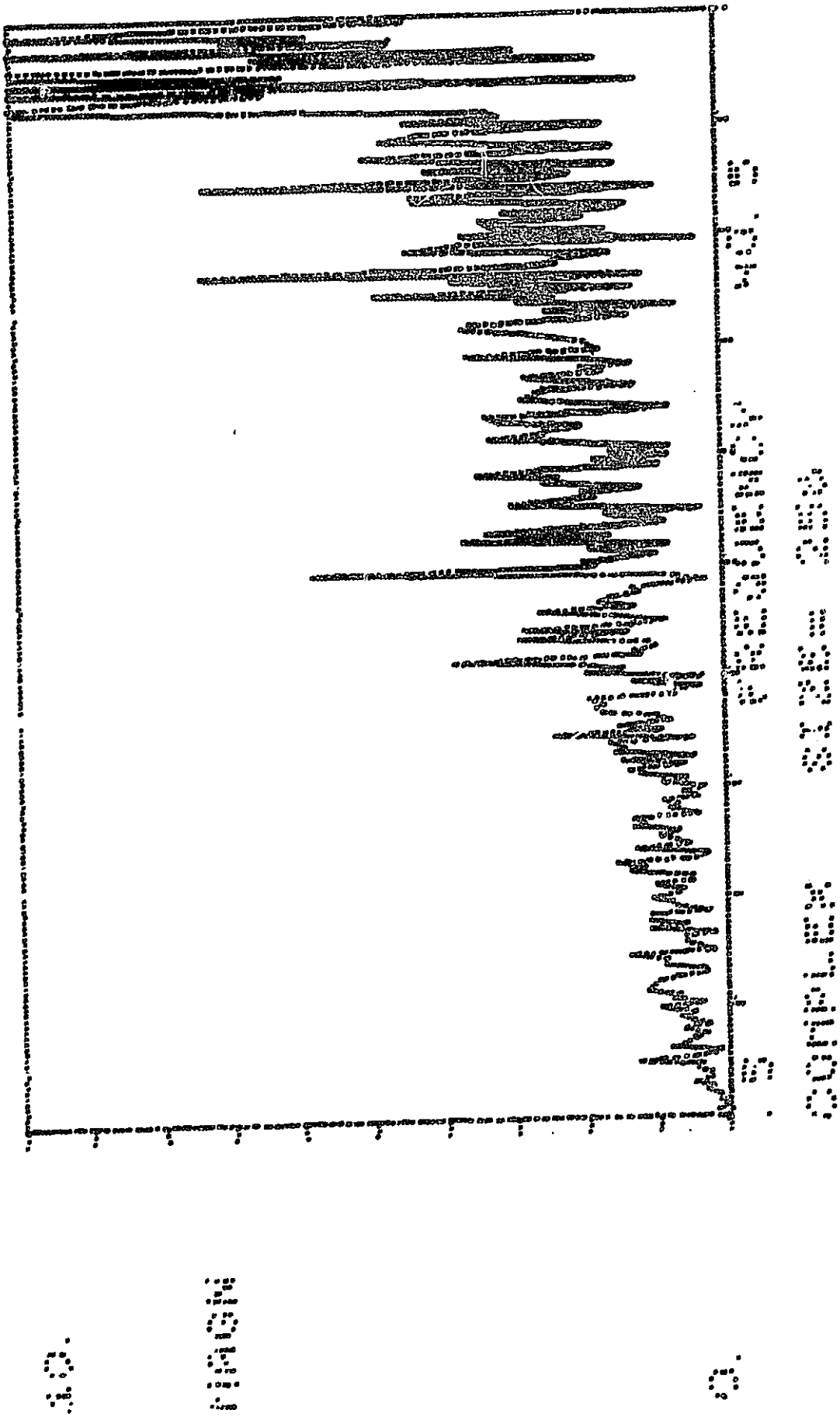


AL8/FL3

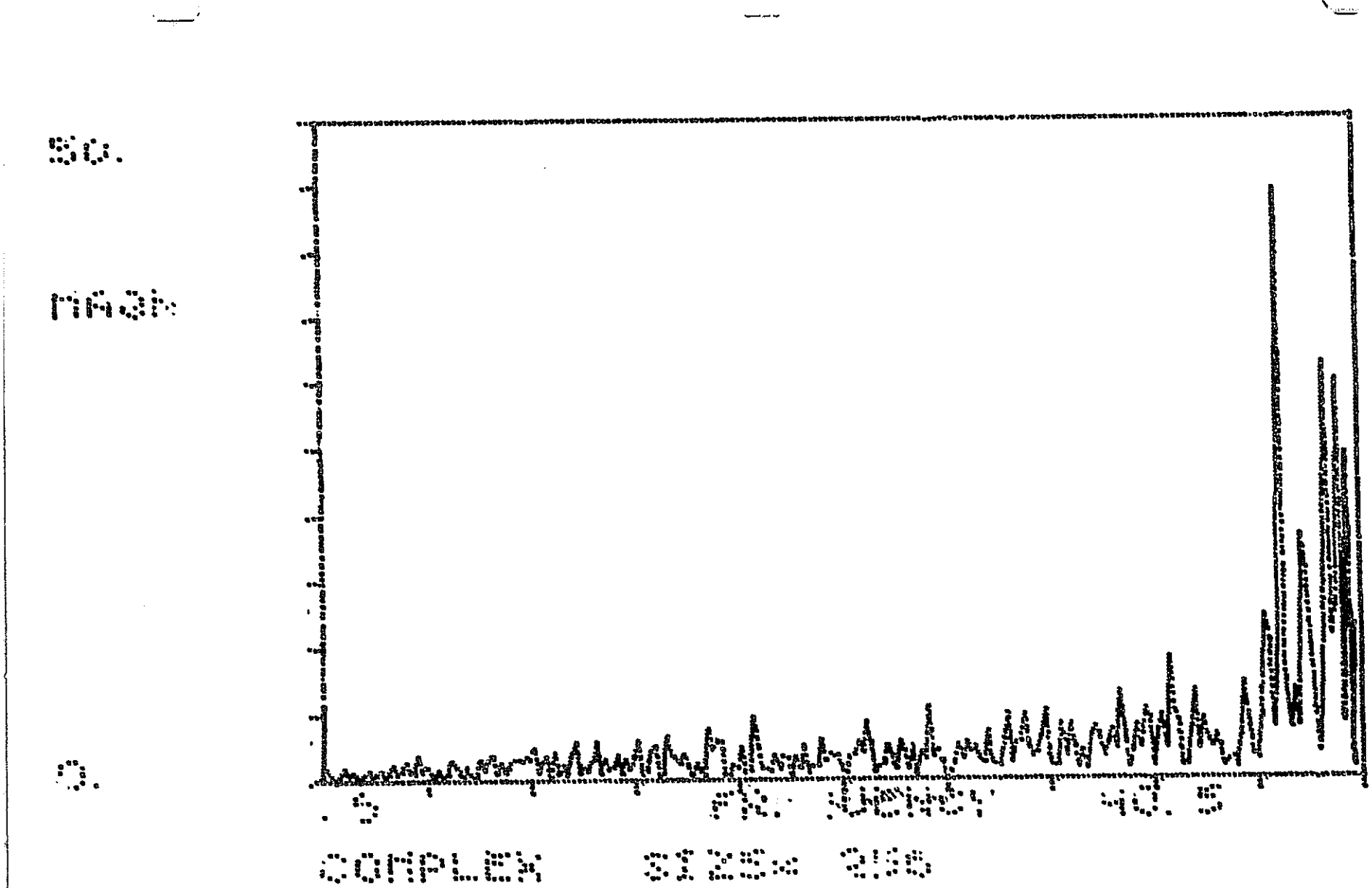
AL8/FL3



AL9/FL3



AL9/FL3



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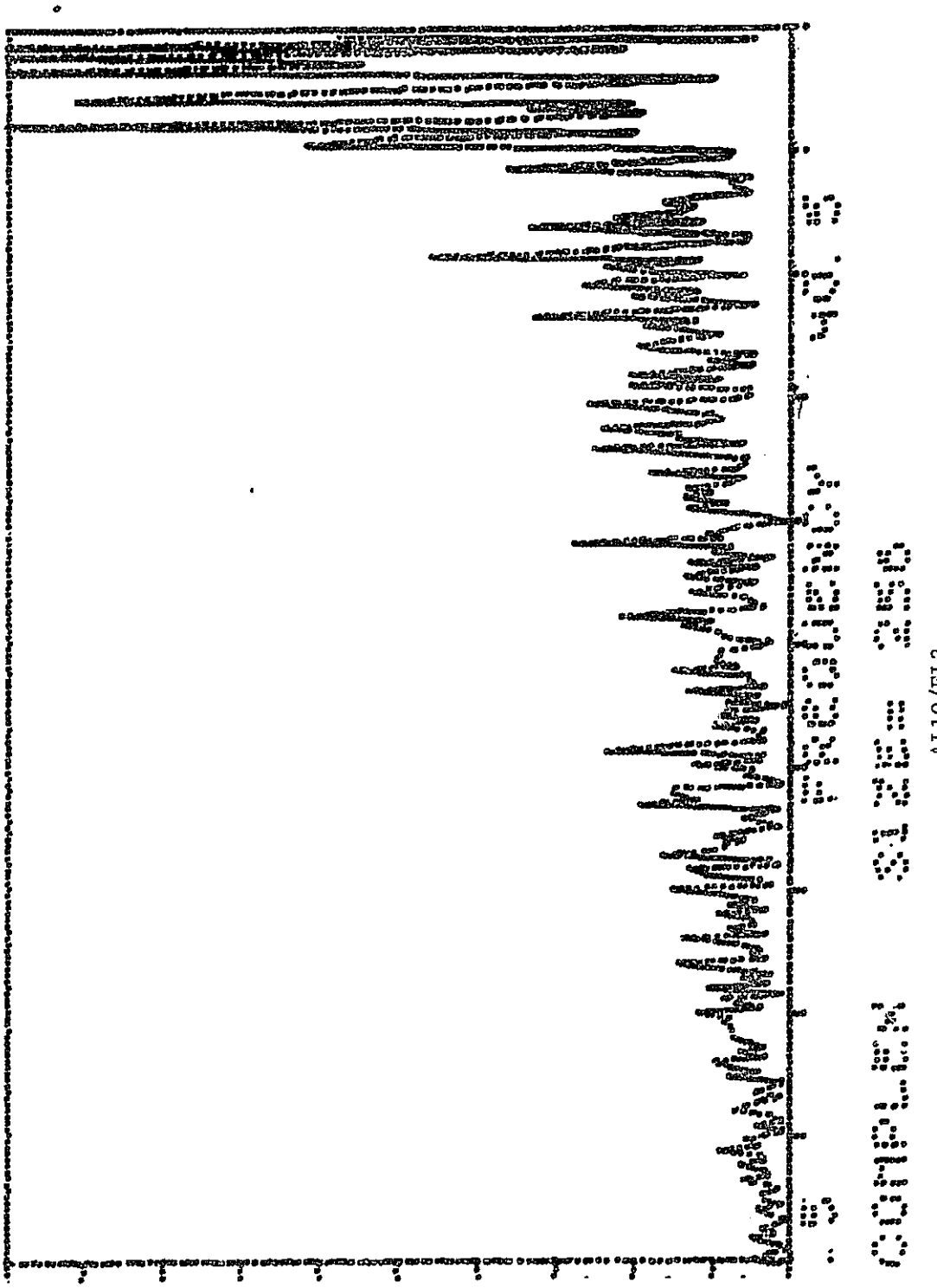
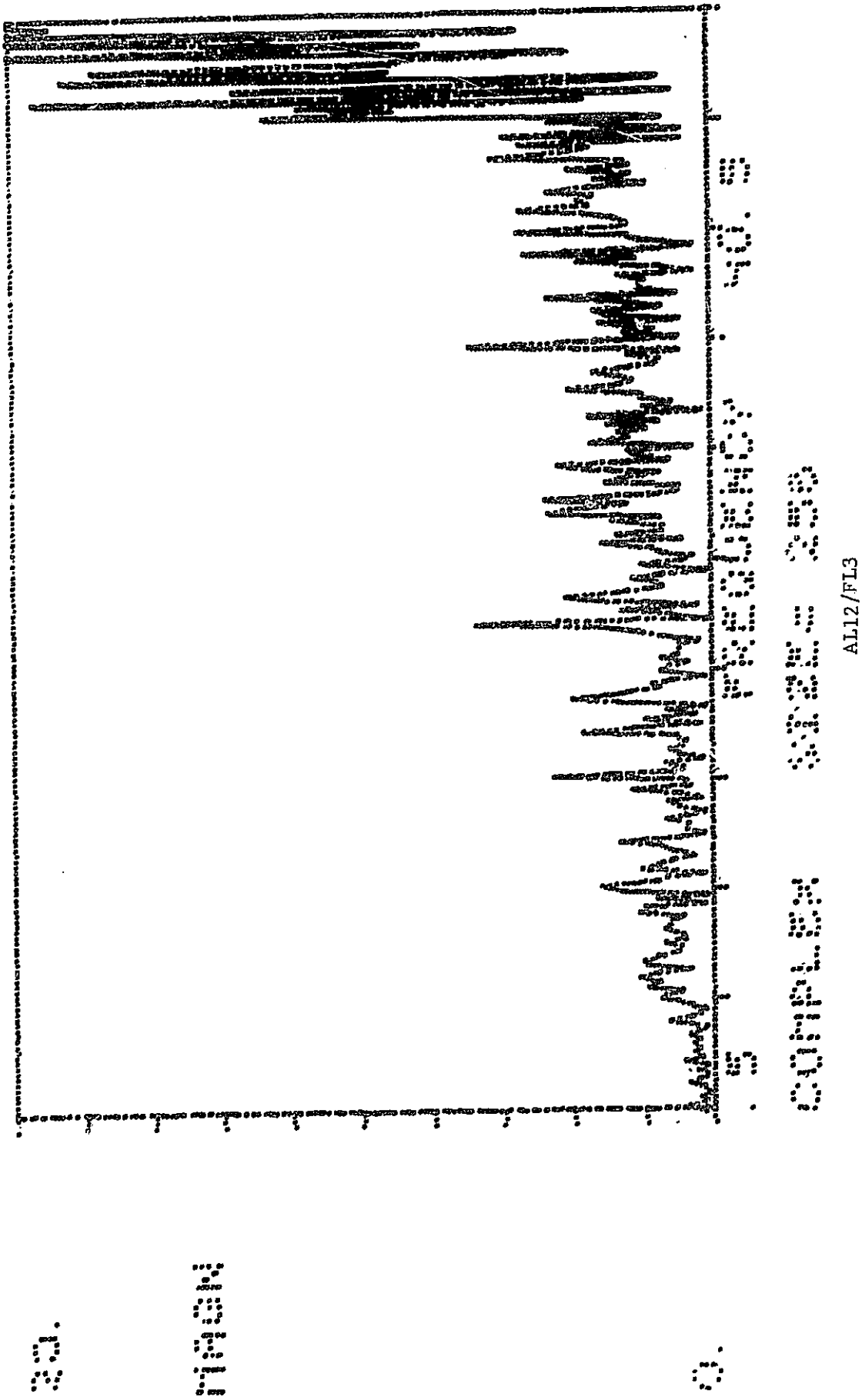
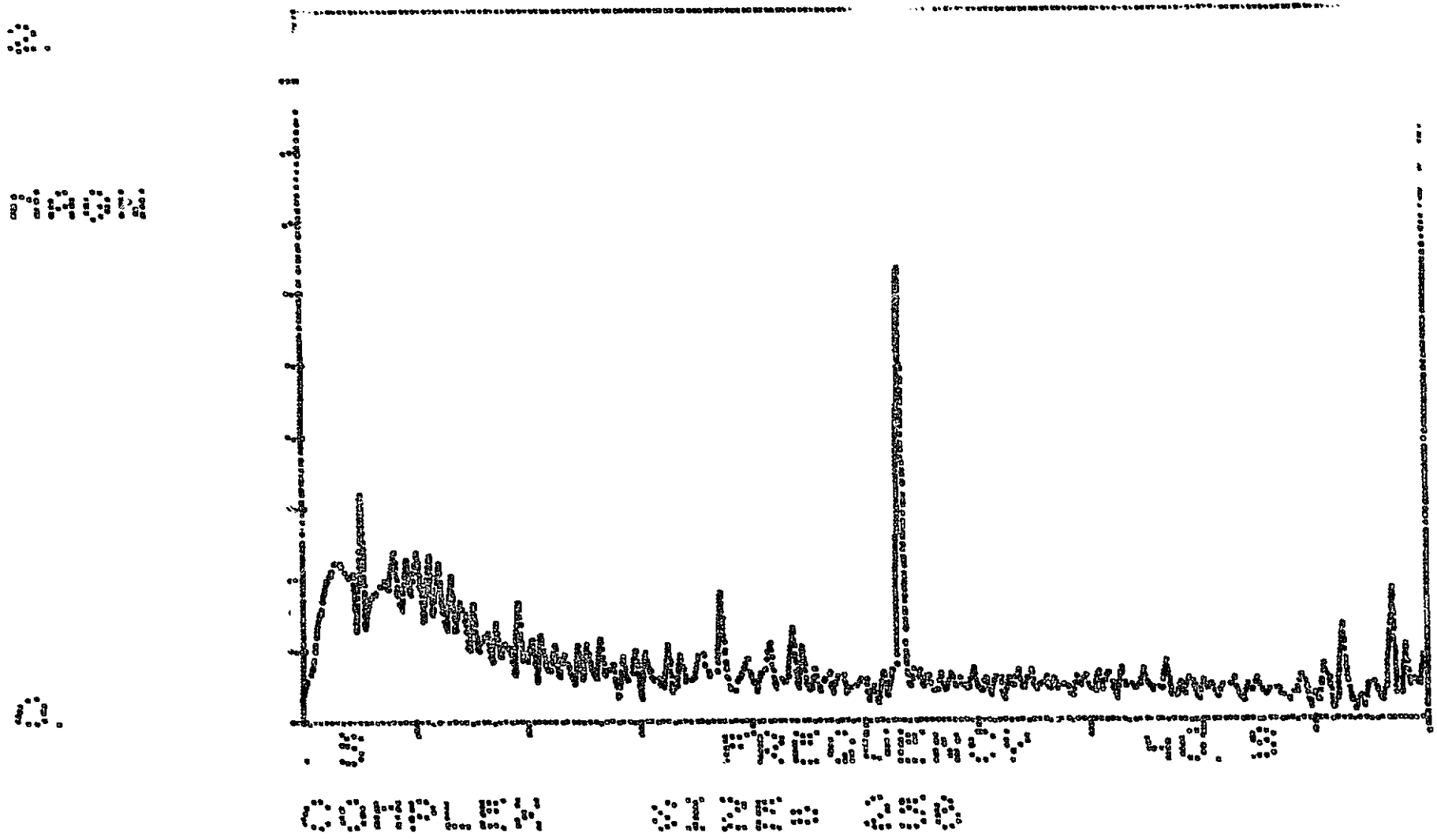


AL10/FL3



AL12/FL3



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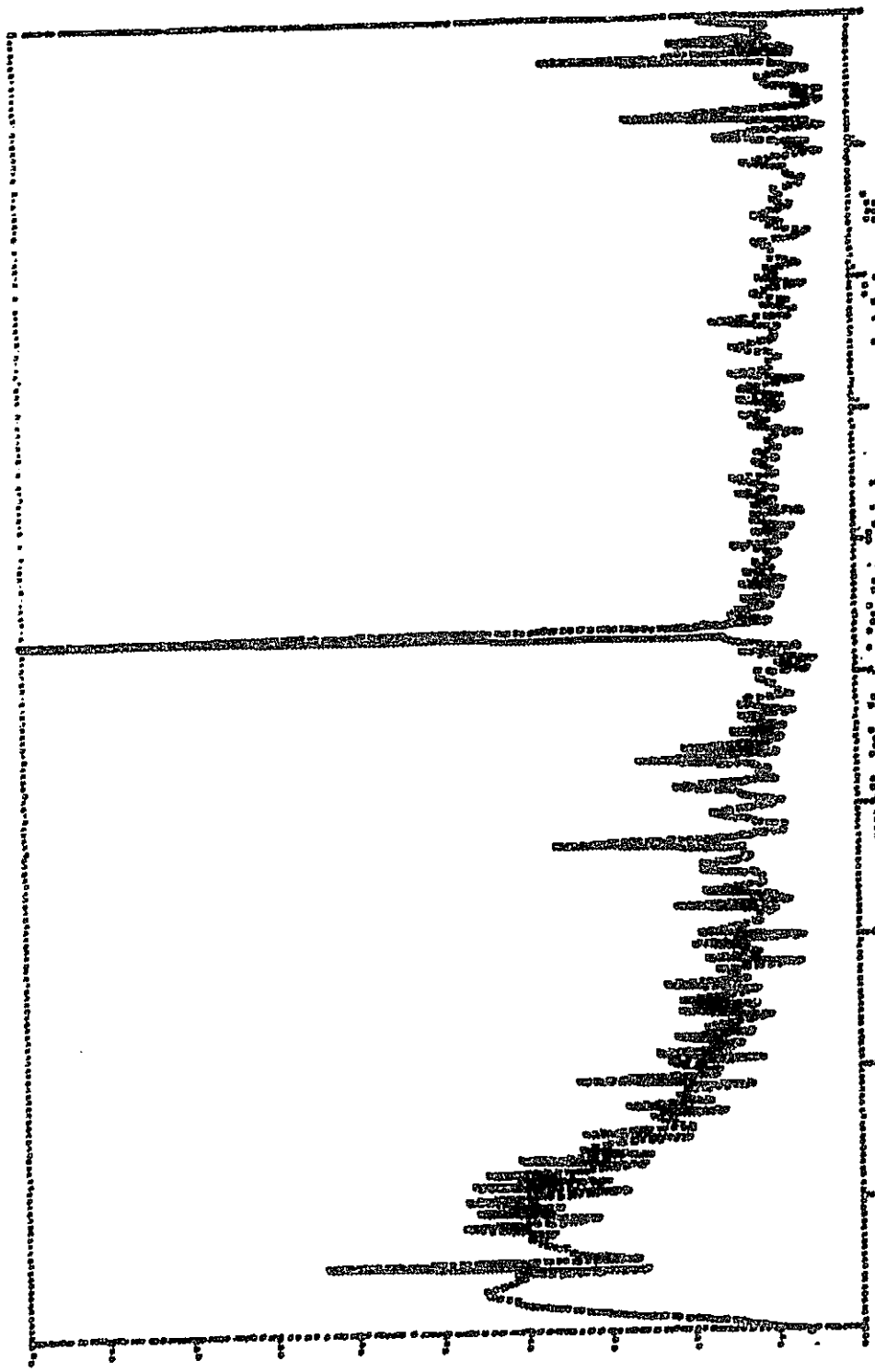

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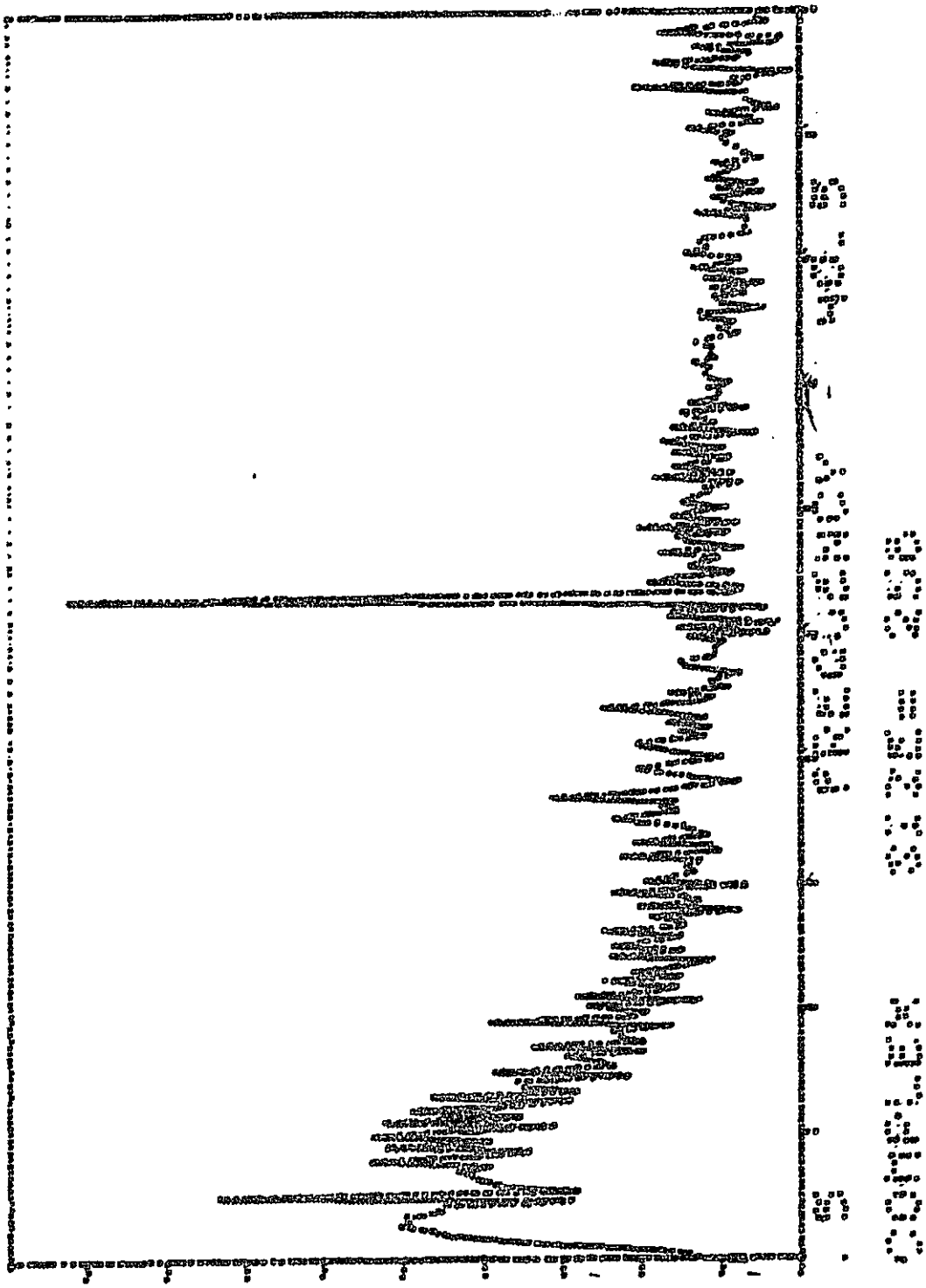
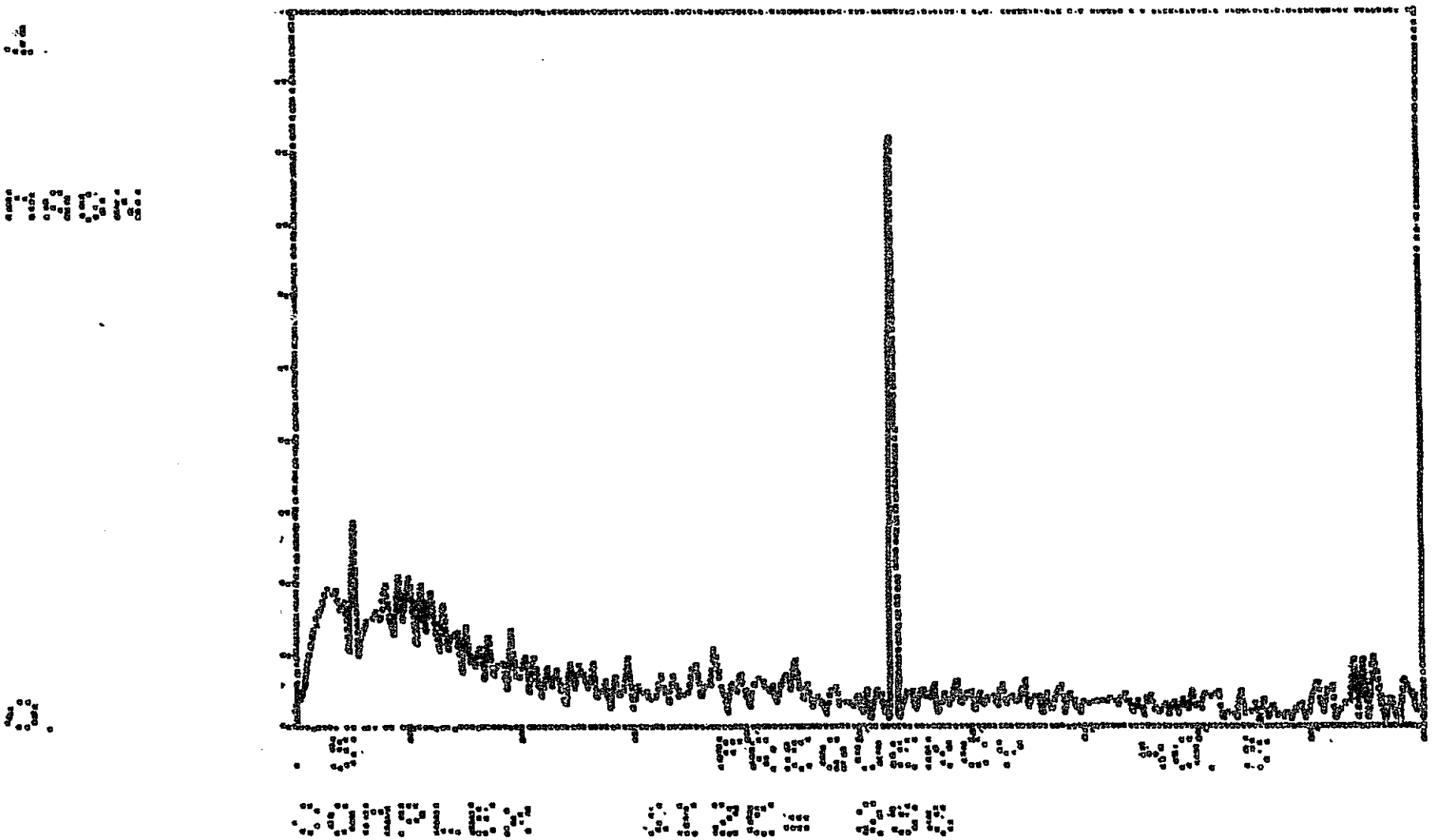


DL2/FL3



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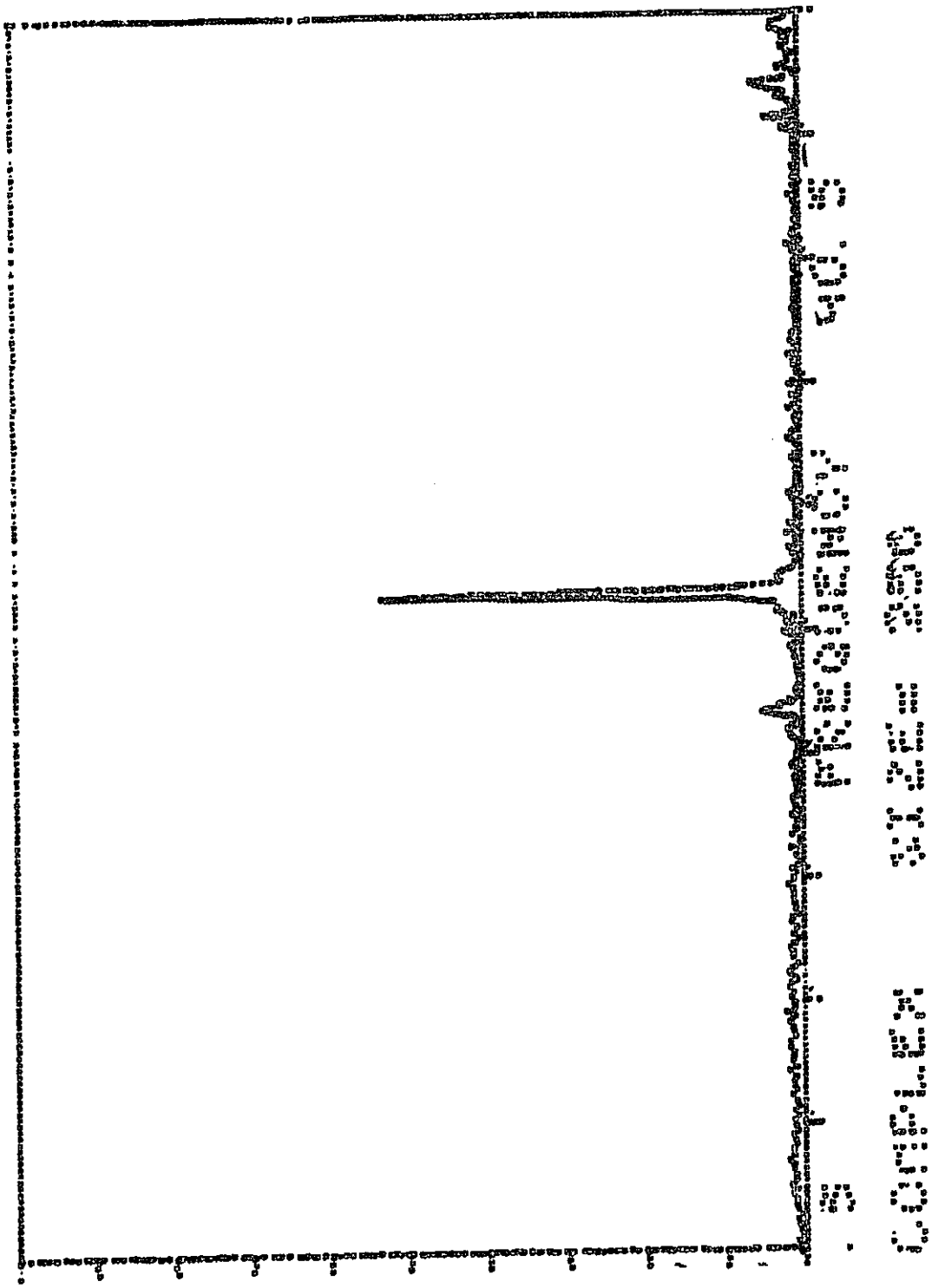
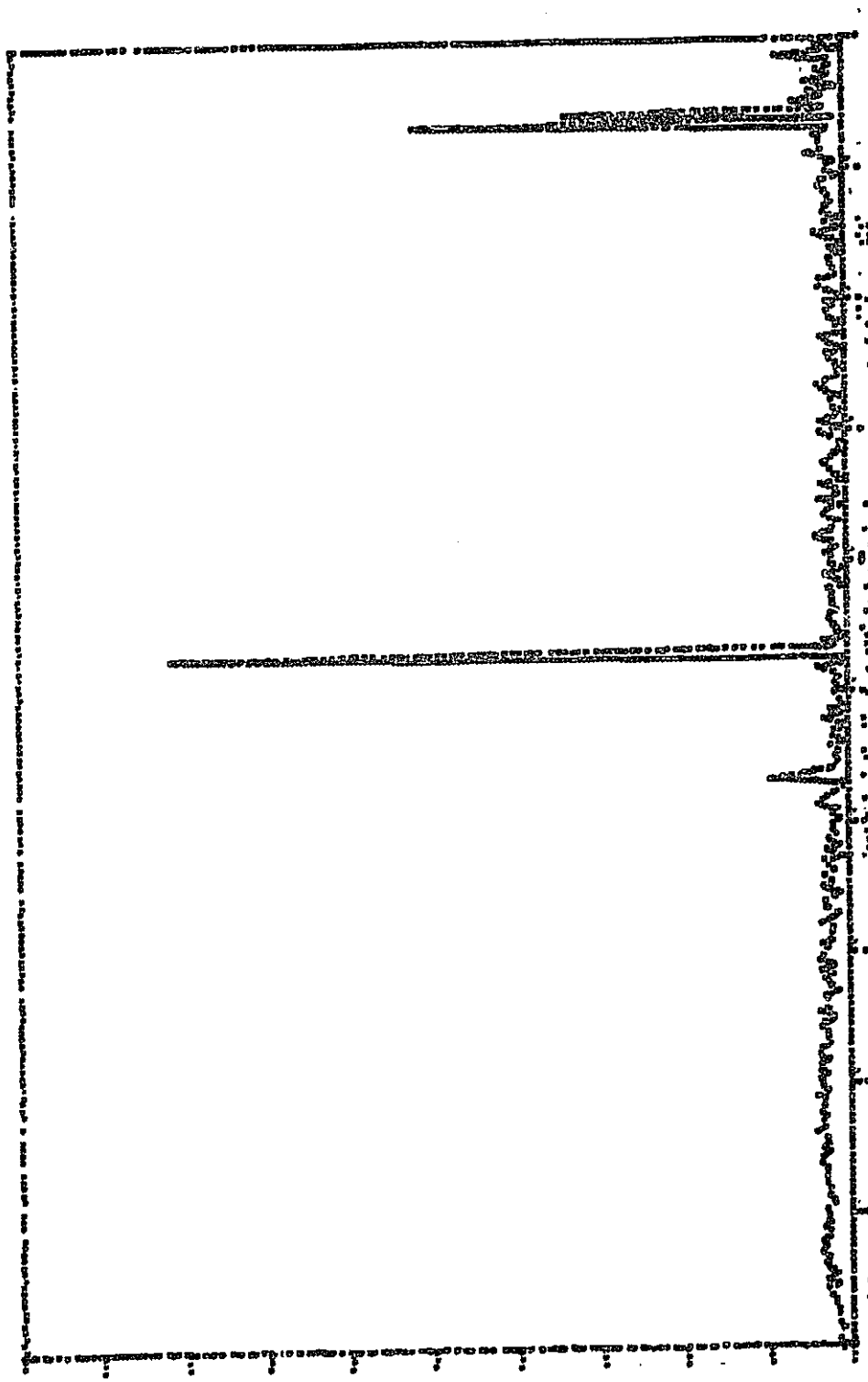


DL4/FL3

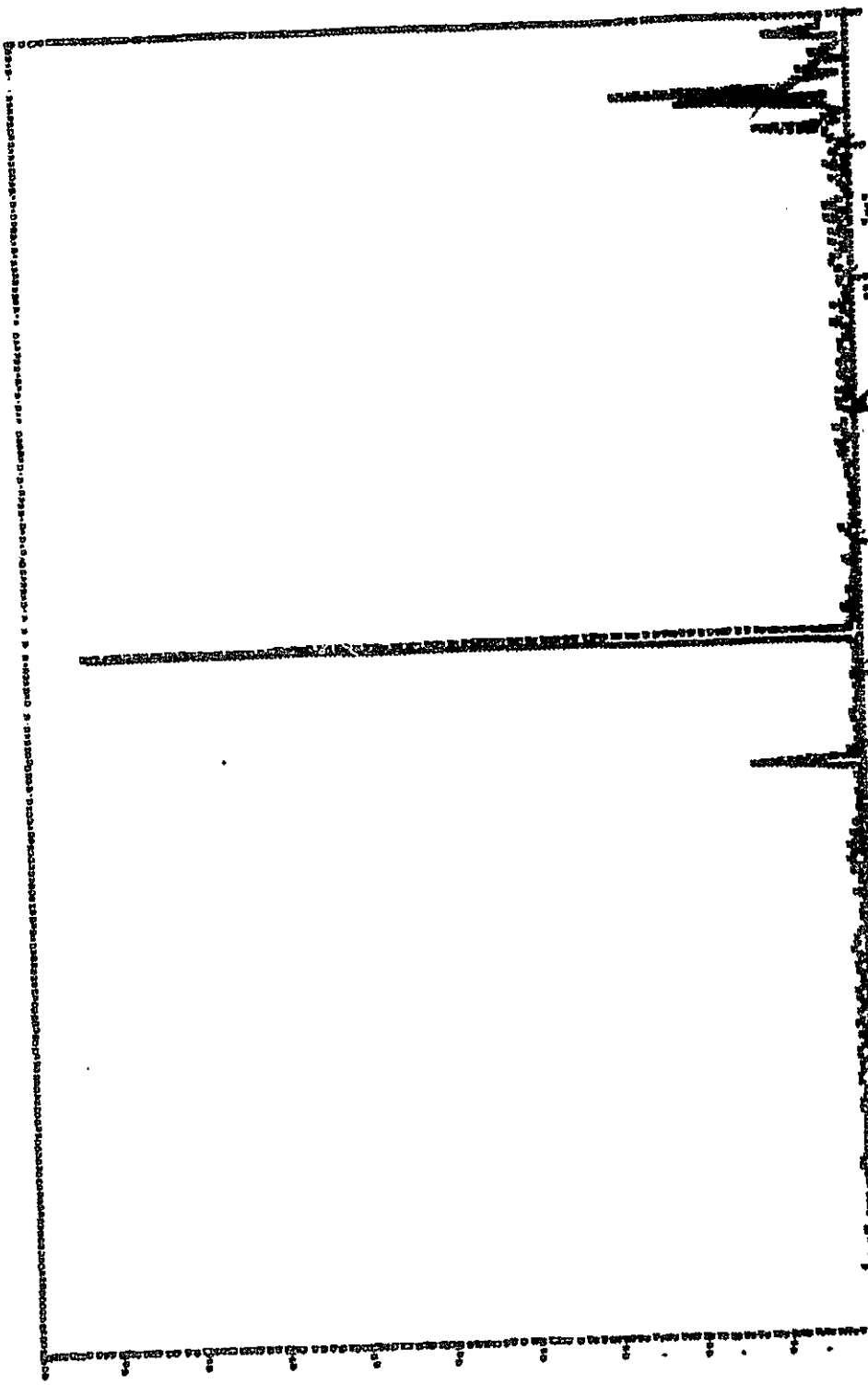
DL4/FL3



DL5/FL3

DL6/FL3

DL6/FL3



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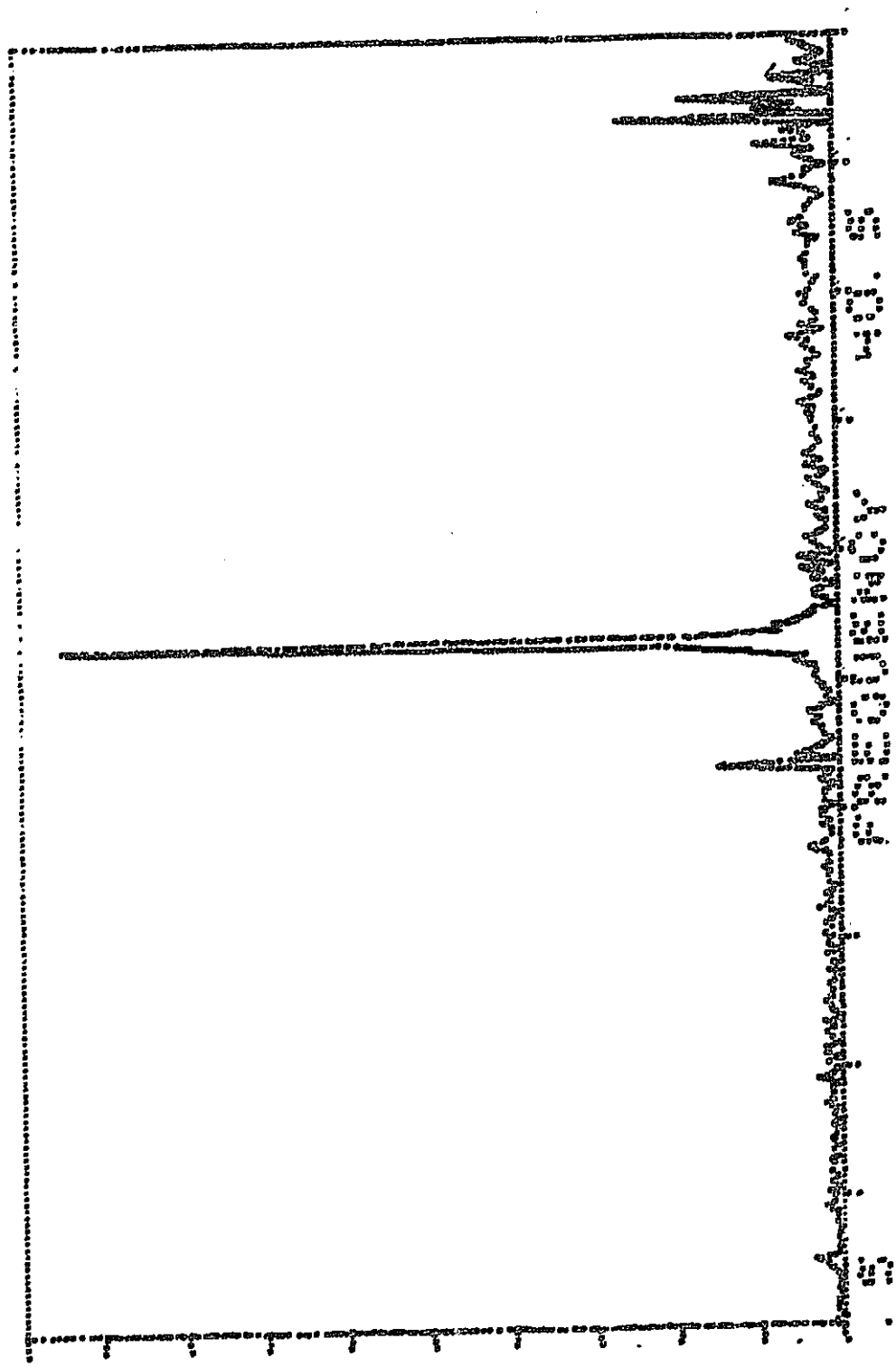
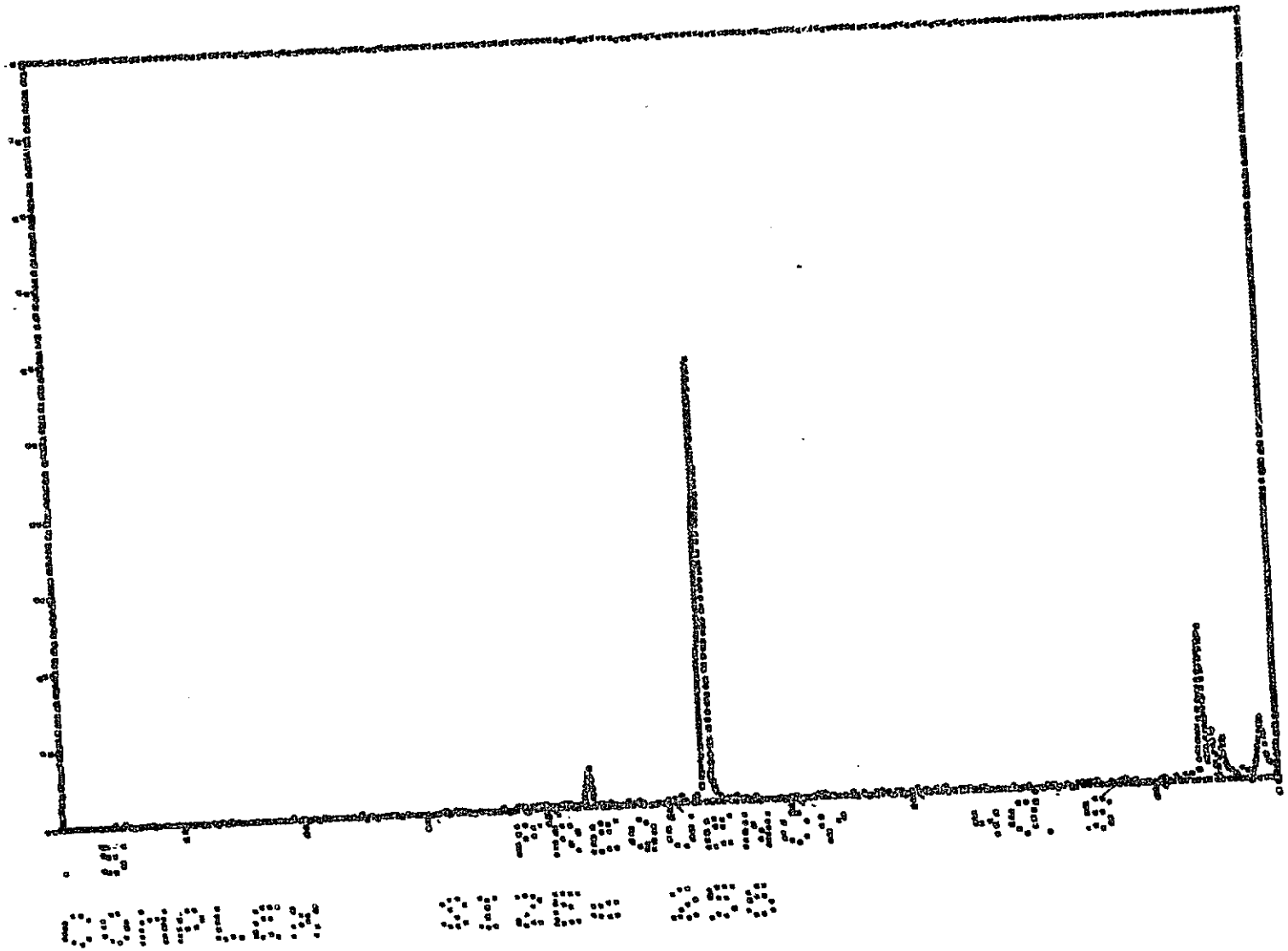


DL8/FL3

DL9/FL3

DL10/FL3

DL11/FL3



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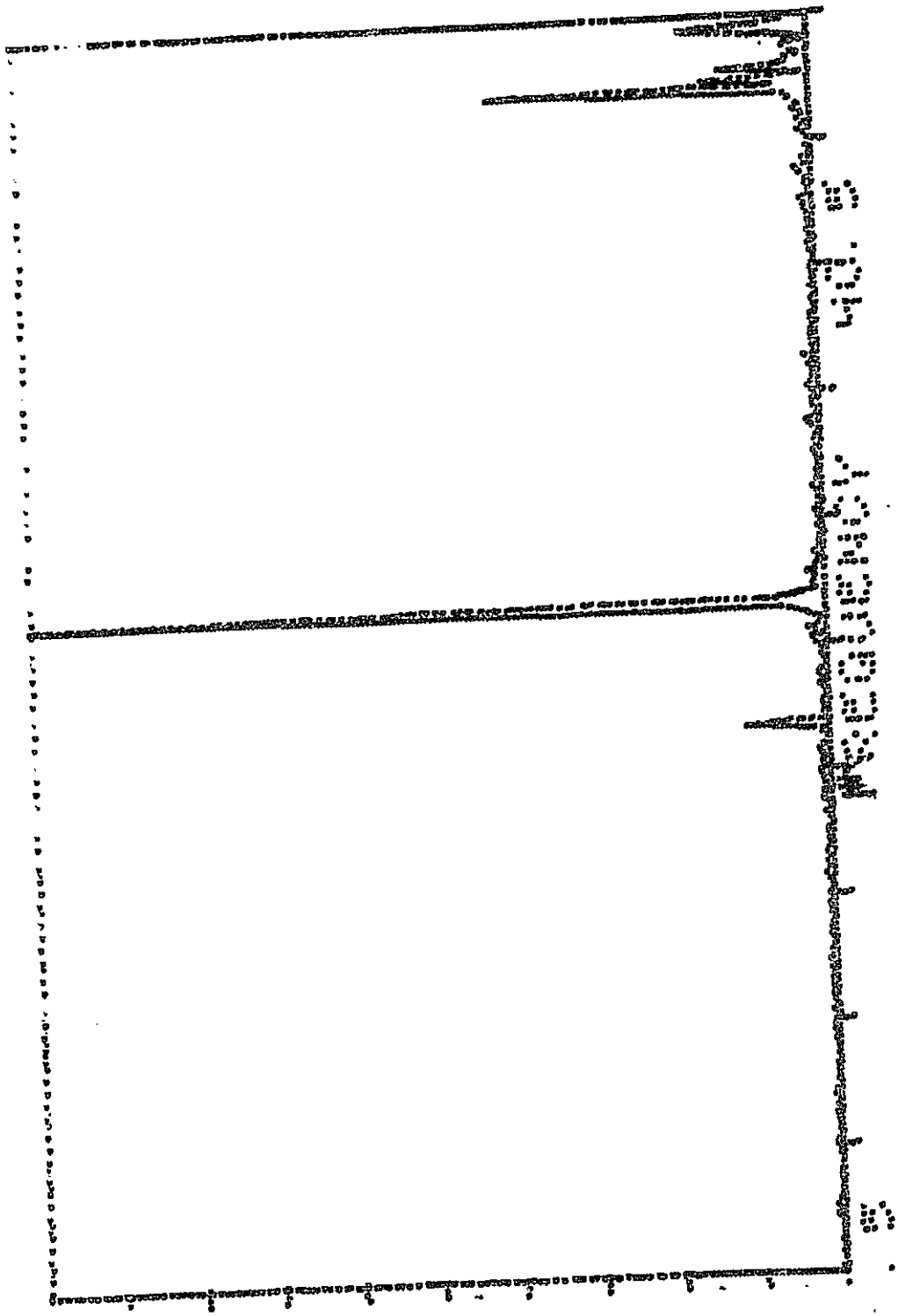

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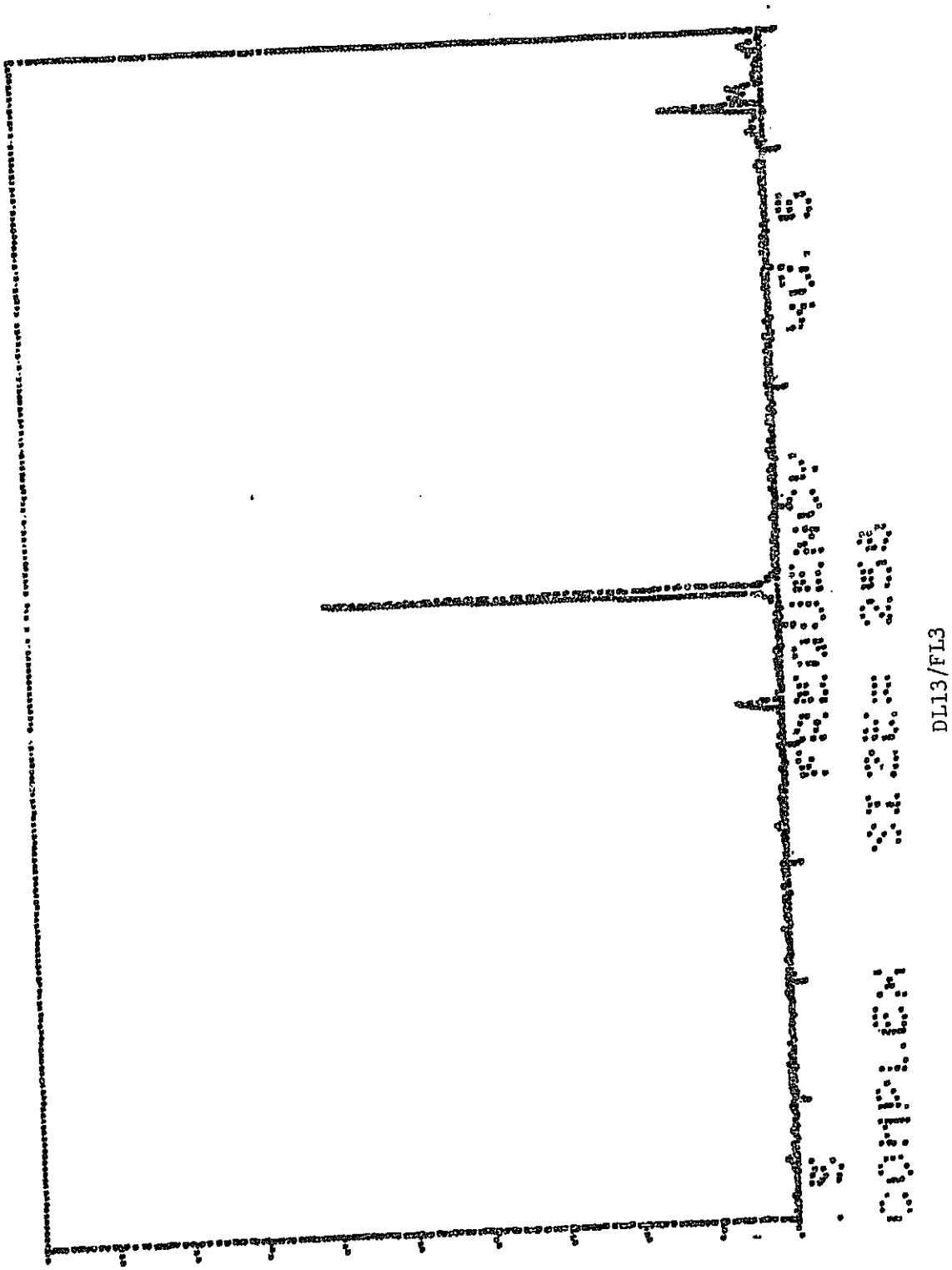

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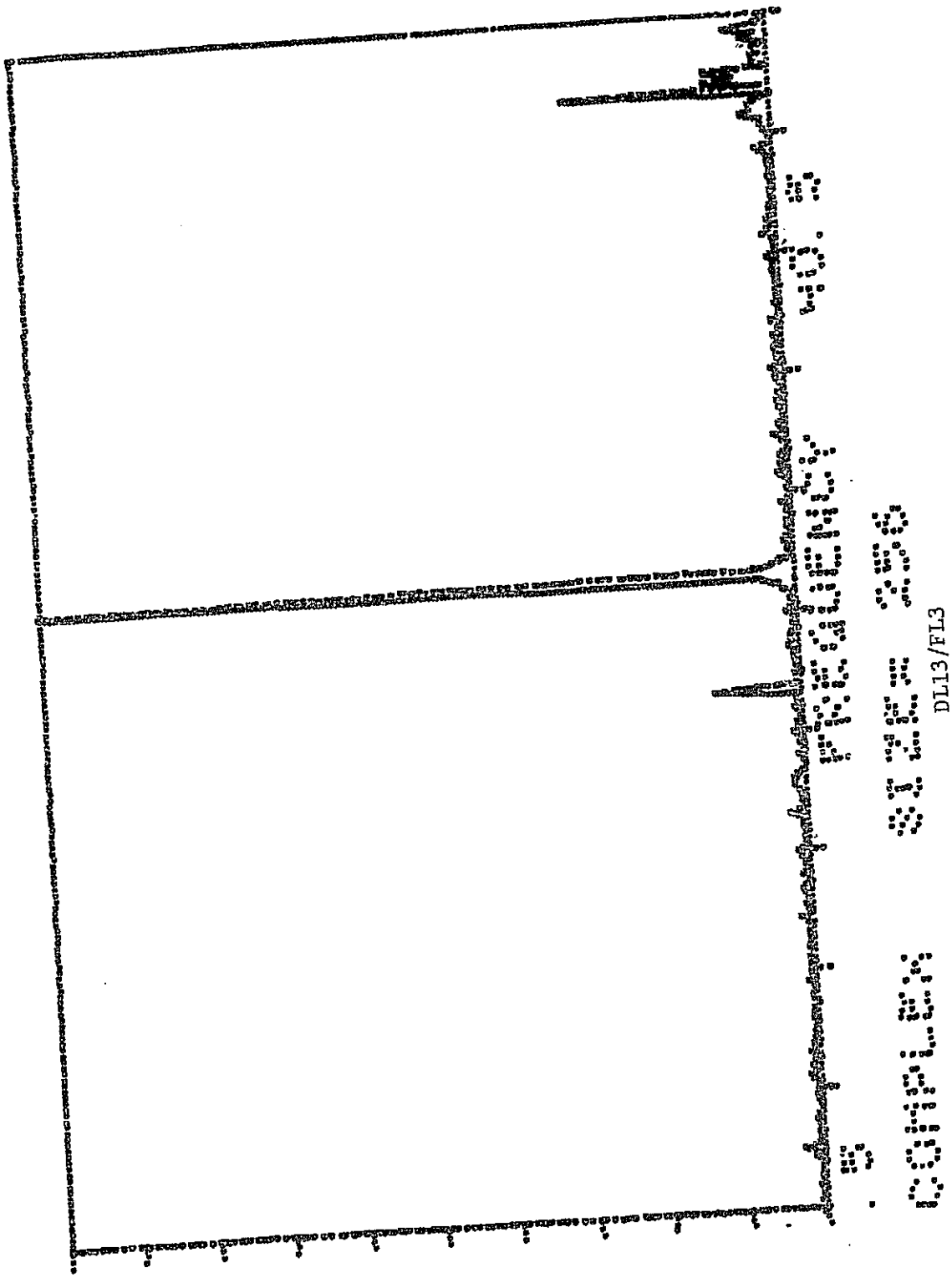
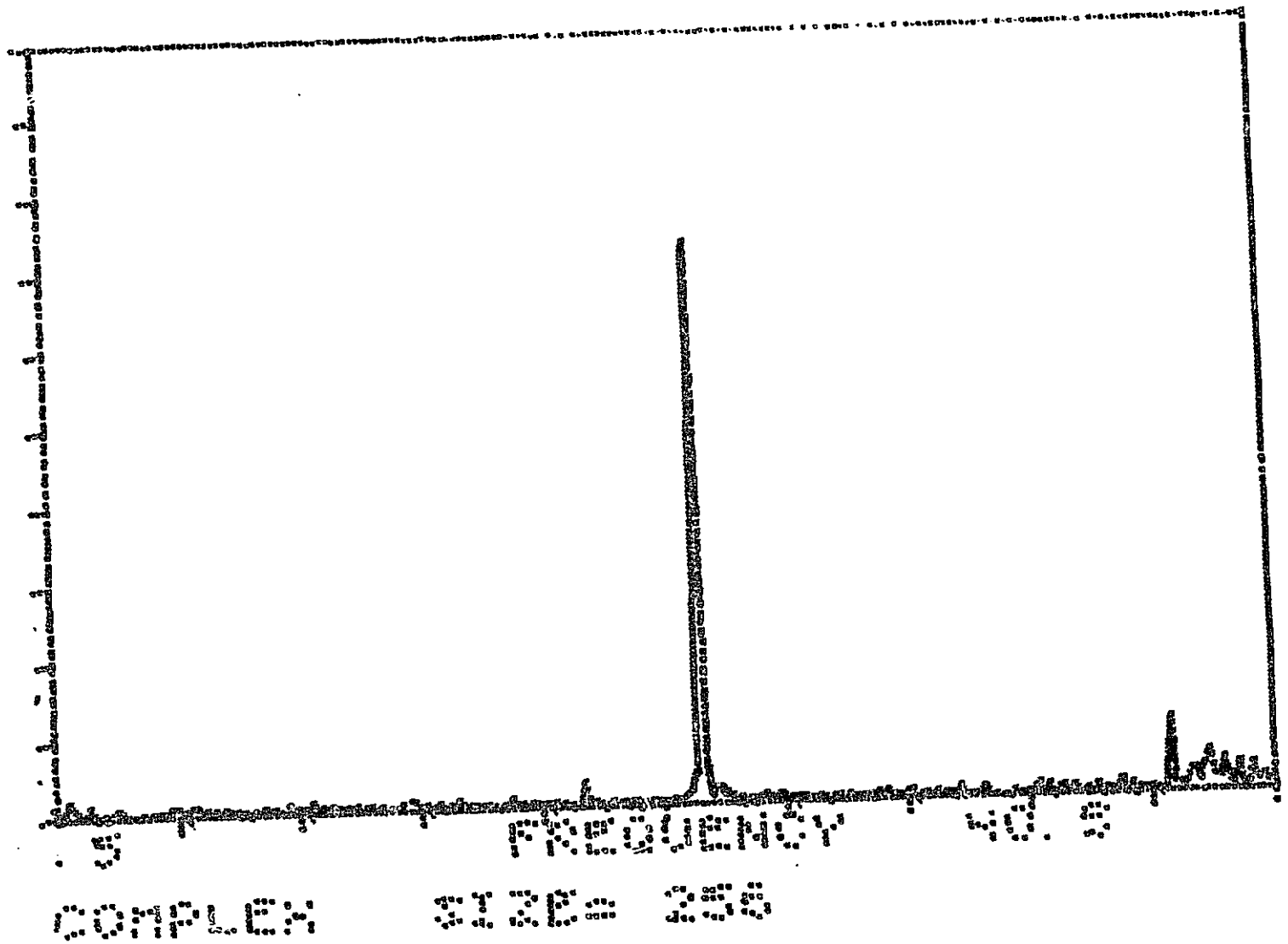


DL13/FL3

DL14/FL3



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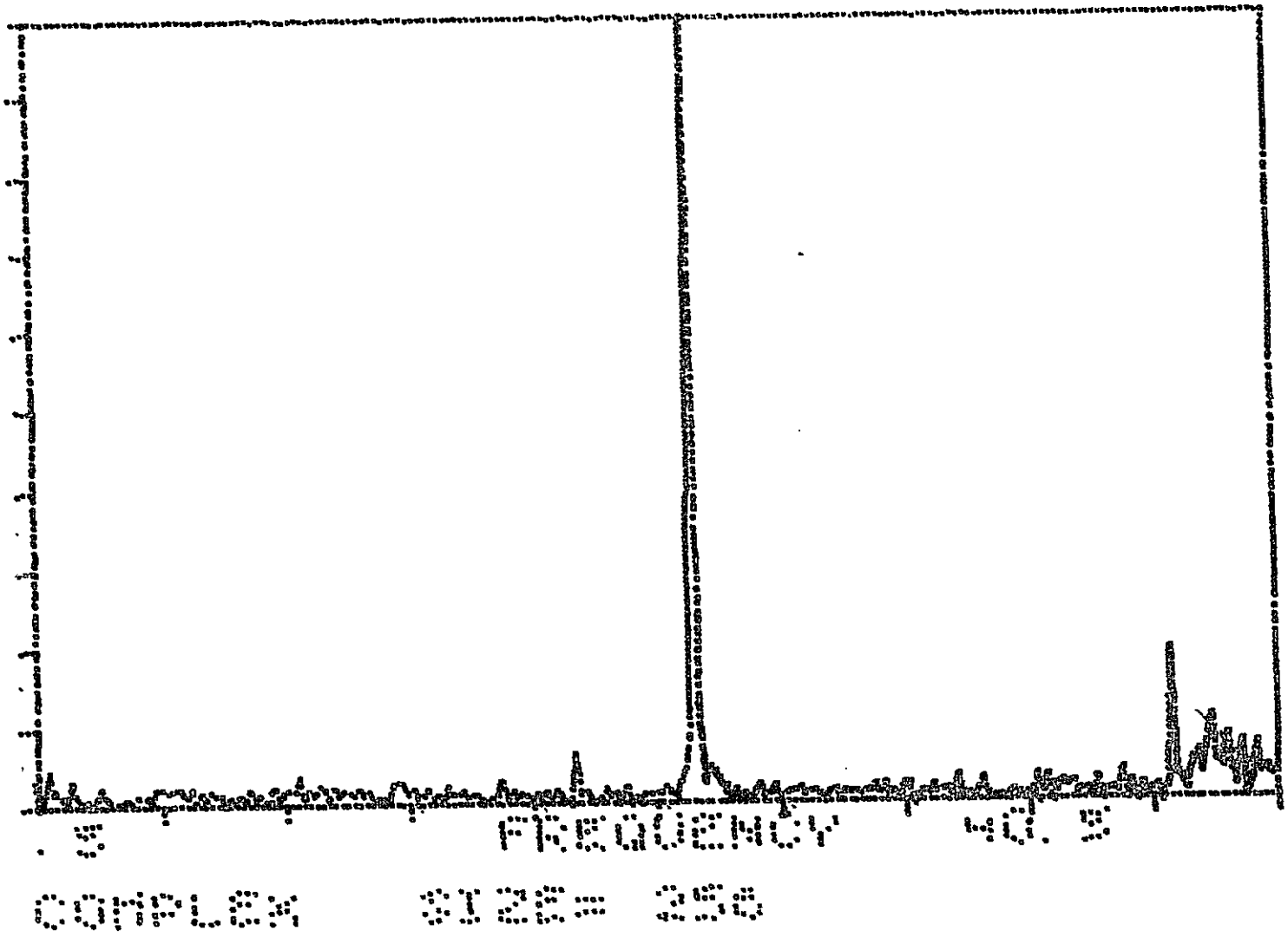

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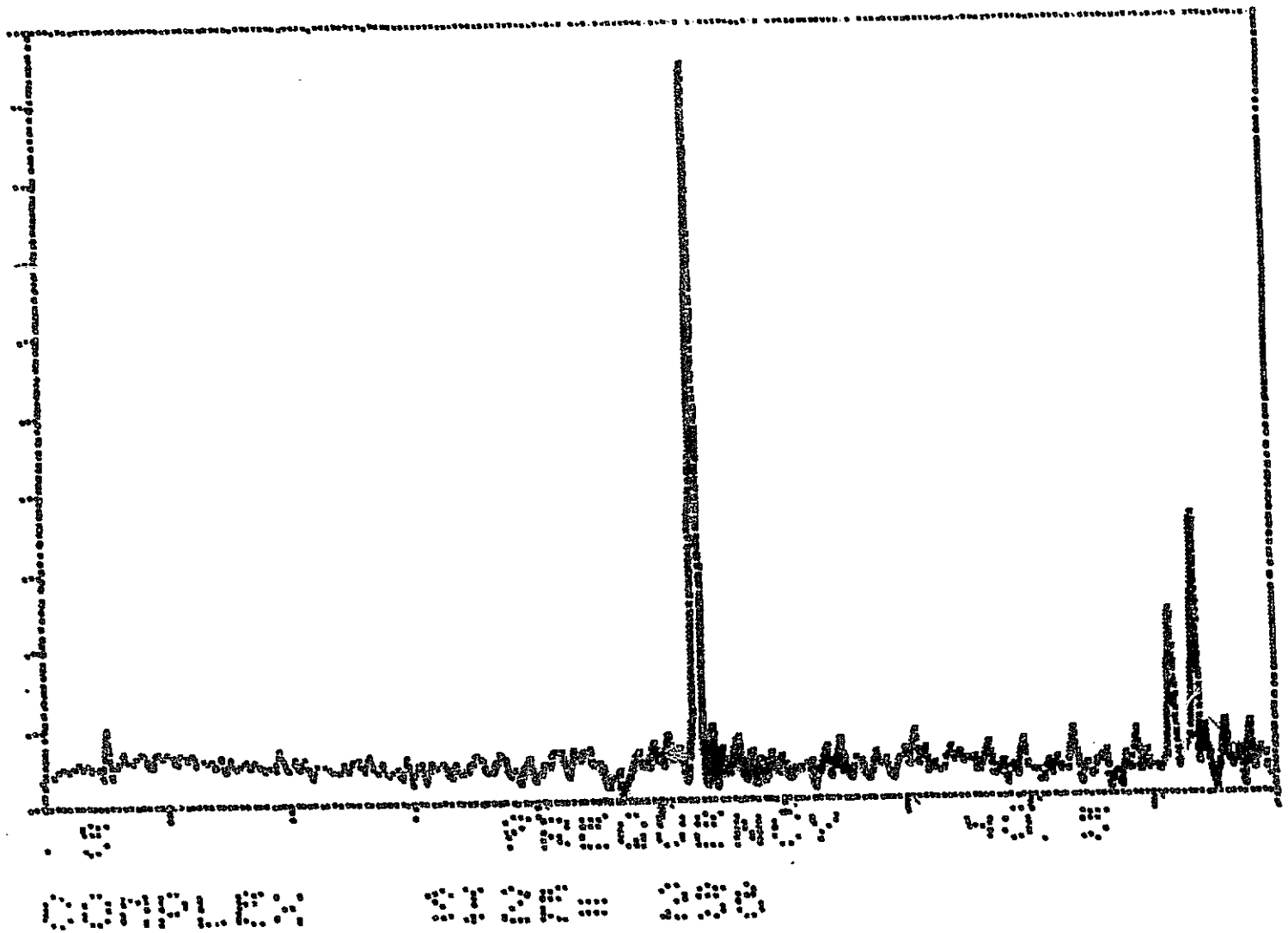


DL16/FL3

DL17/FL3

VOLUME IV

RUN 46 TEST DATA

X-AXIS, 5010 POUND/ACTUATOR TEST LEVEL,
SINGLE ACTUATOR

```
   1 HEADING: TRK TRN TRANS FUNCT Z=AXIS 5010 LB R#46 3/31/75

SWEEP PARMETERS:
   2 MODE  1=LOG, Ø=LIN: 1
   3 TYPE  1=UNI-DIRECTIONAL, Ø=BI-DIRECTIONAL: 1
   4 START, END FREQ, HZ: .5,5Ø
FREQ RANGE -- OCTAVES, DECADES:    6.64   2.
   5 SPECIFICATION  1=RATE, Ø=DURATION: 1
   6 UNITS  1=OCT/MIN, Ø=DEC/MIN: 1
   7 RATE, OCT/MIN: 2
SWEEP DURATION -- MIN, SEC:     3     19

TEST LENGTH:
   8 SPECIFICATION  1=TIME, Ø=SWEEP CYCLES: Ø
   9 CYCLES: 1
TEST TIME -- HRS, MIN, SEC:     Ø      3     19

START-UP AND SHUT-DOWN:
  1Ø START-UP TIME, SEC: 12Ø
  11 SHUT-DOWN TIME, SEC: .5

VIBRATION LIMITS (P-P):
  12 DISPLACEMENT, IN: 5ØØØ
  13 VELOCITY, IN/SEC: 9999
  14 ACCELERATION, G: 45Ø

REFERENCE CONTROL SPECTRUM:
  15 TYPE, VALUE, FREQ, ABORT LIMIT: 2,6Ø,.5,8
  16 TYPE, VALUE, FREQ, ABORT LIMIT: 2,6Ø,5,8
  17 TYPE, VALUE, FREQ, ABORT LIMIT: 2,6Ø,5Ø,4
  18 TEST LEVEL (DB BELOW REF): 6

ACCELERATION SIGNALS:
  19 NR OF SIGNALS: 1
     CHANNEL NRS: 1
  2Ø 1=PEAK, Ø=RMS: Ø
  21 SENSITIVITY, MV/G: 22.22
  22 STRATEGY  1=MAX, Ø=AVG: 1

LIMIT SIGNALS:
  23 NR OF SIGNALS: Ø

ABORT LINES:
  24 NR OF LINES: Ø
ALARM LINES:
  25 NR OF LINES: Ø
  26 1=DUAL-CHANNEL A/D, Ø=ACE: 1
  27 COMPRESSION SPEED  2=HIGH, 1=NORMAL, Ø=LOW: 1
```

POST-TEST DOCUMENTATION

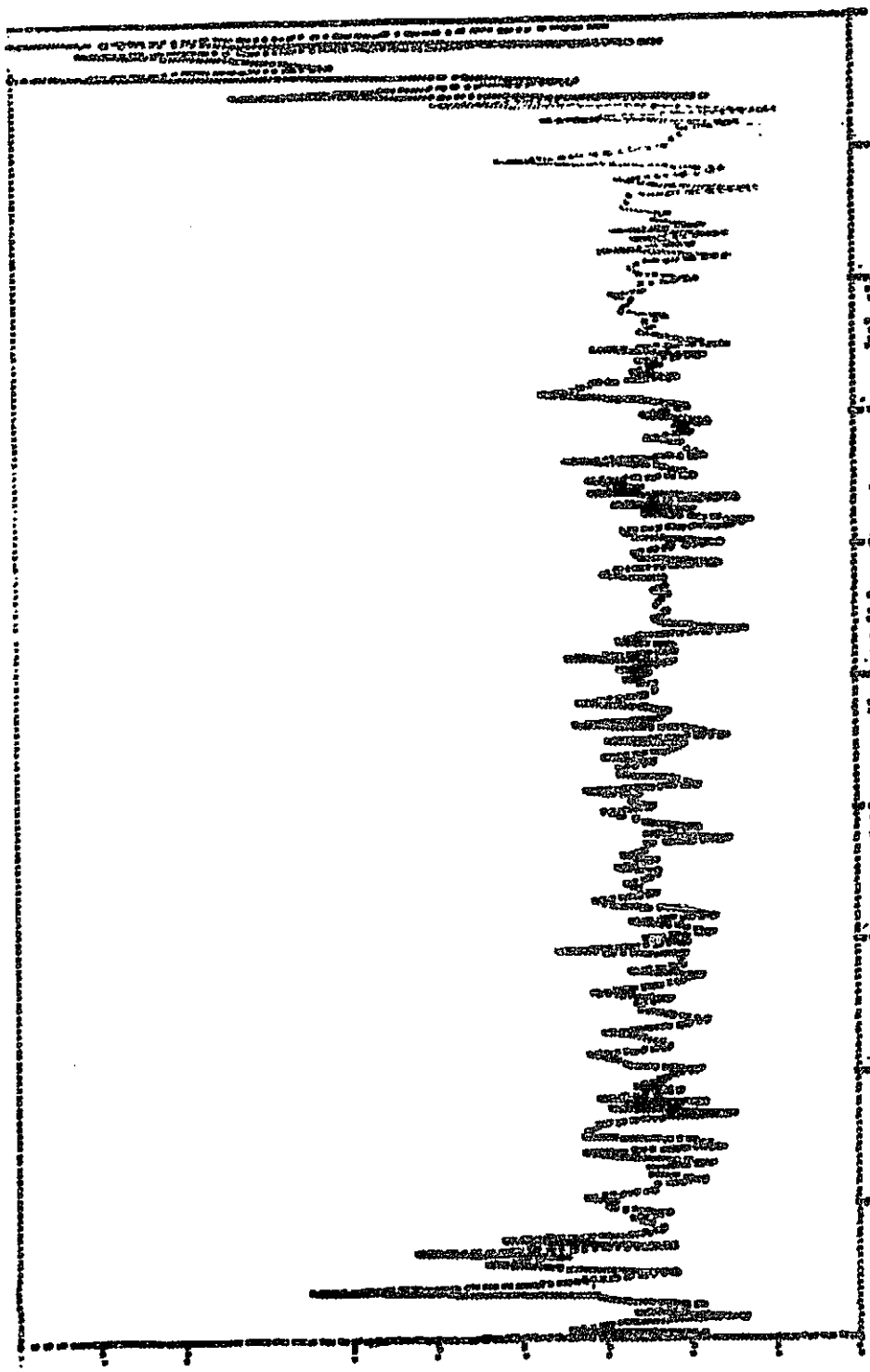
TRK TRN TRANS FUNCT Z-AXIS R# 46 4010LB 3/31/75

COMPLETION STATUS: ABORTED DURING SWEEP 1 AT 27.58 HZ.
CONTROL LIMITS EXCEEDED.

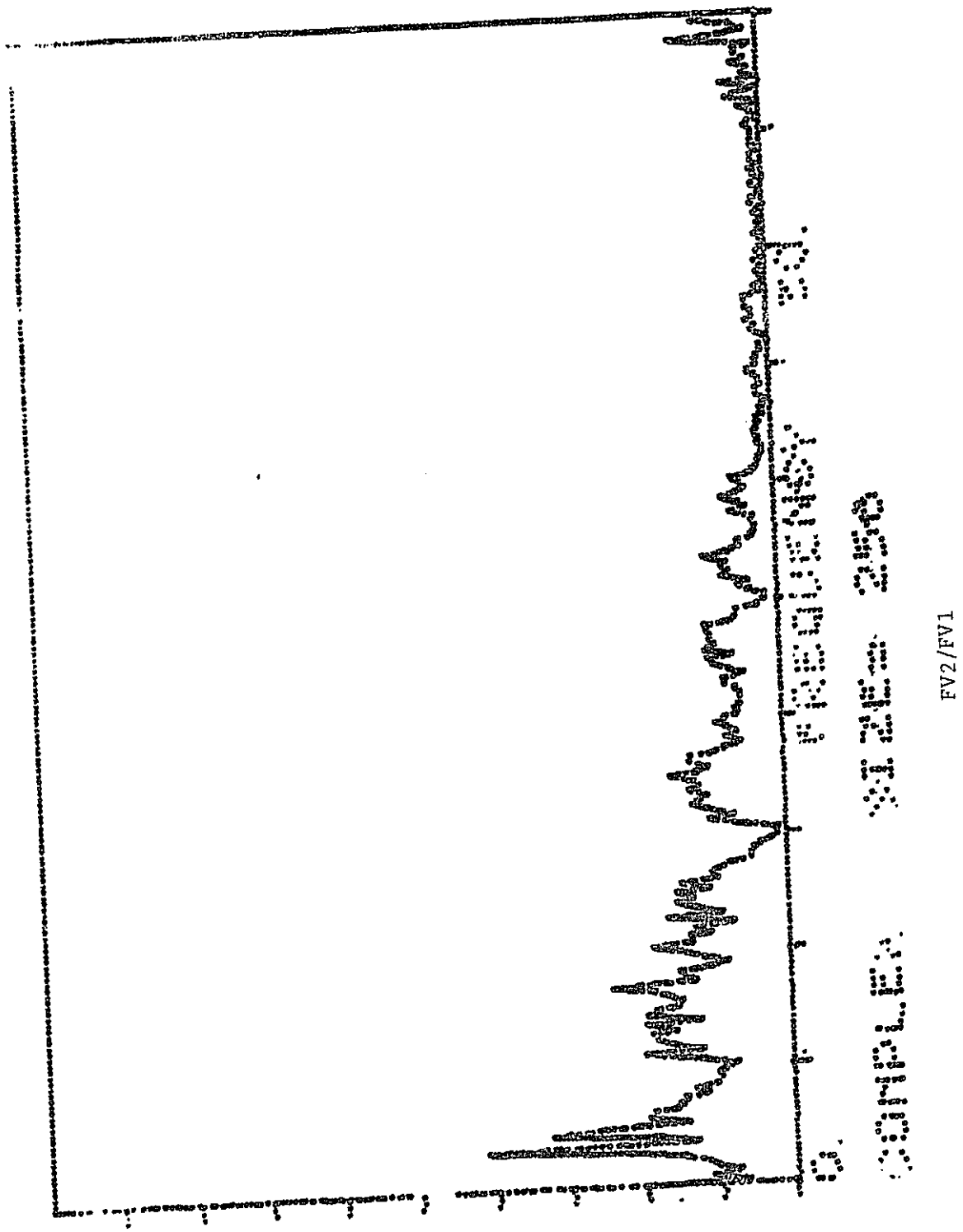
TEST DURATION -- HRS, MIN, SEC: 0 2 53

MAX ABS CONTROL ERROR: 6.32 DB AT 1.208 HZ.
AVG ABS CONTROL ERROR: .2454 DB.

CONTROL CHANNEL	FREQ RANGE (HZ)
SWEEP 1	
1	.5-- 27.58

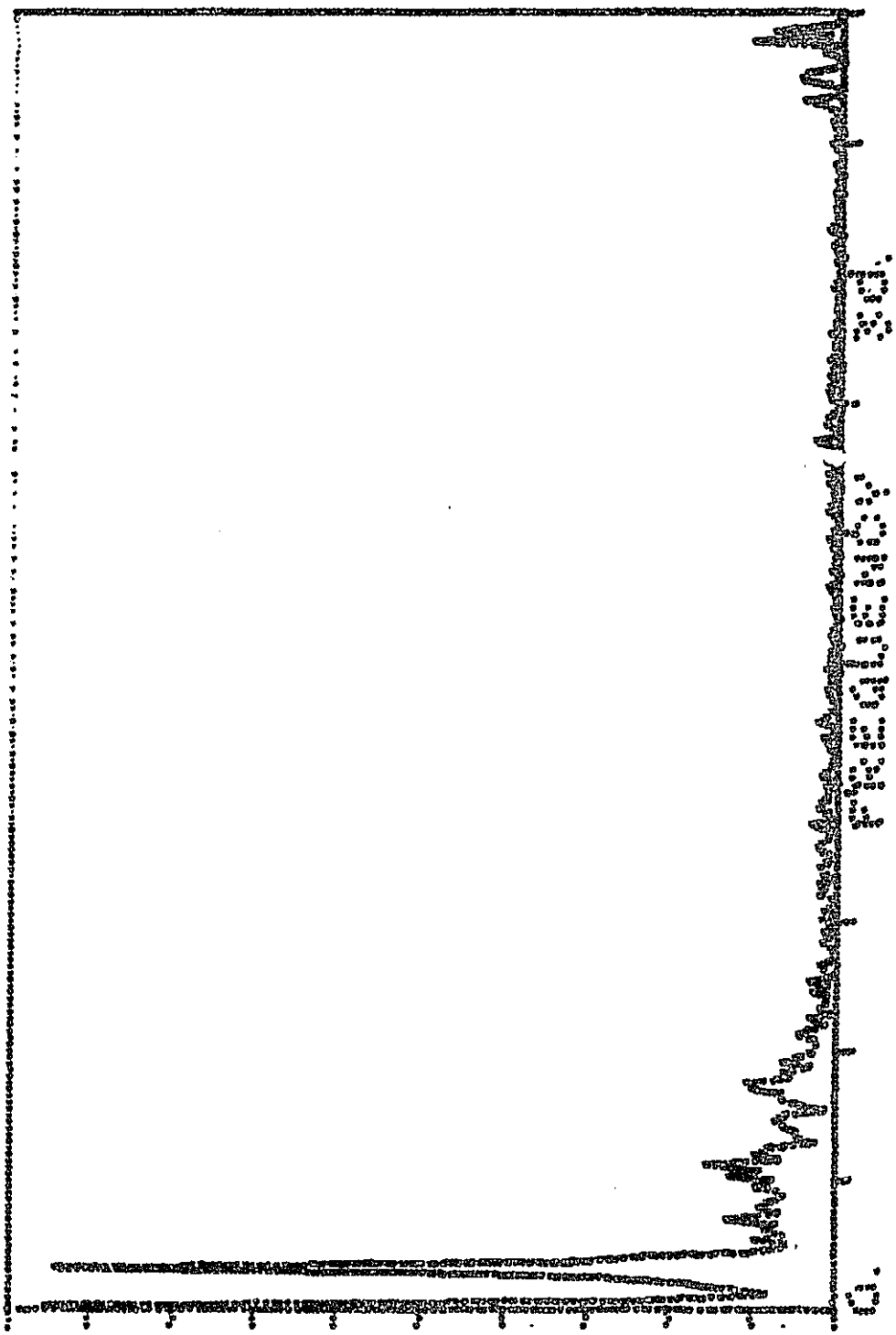


FV1/OSC.

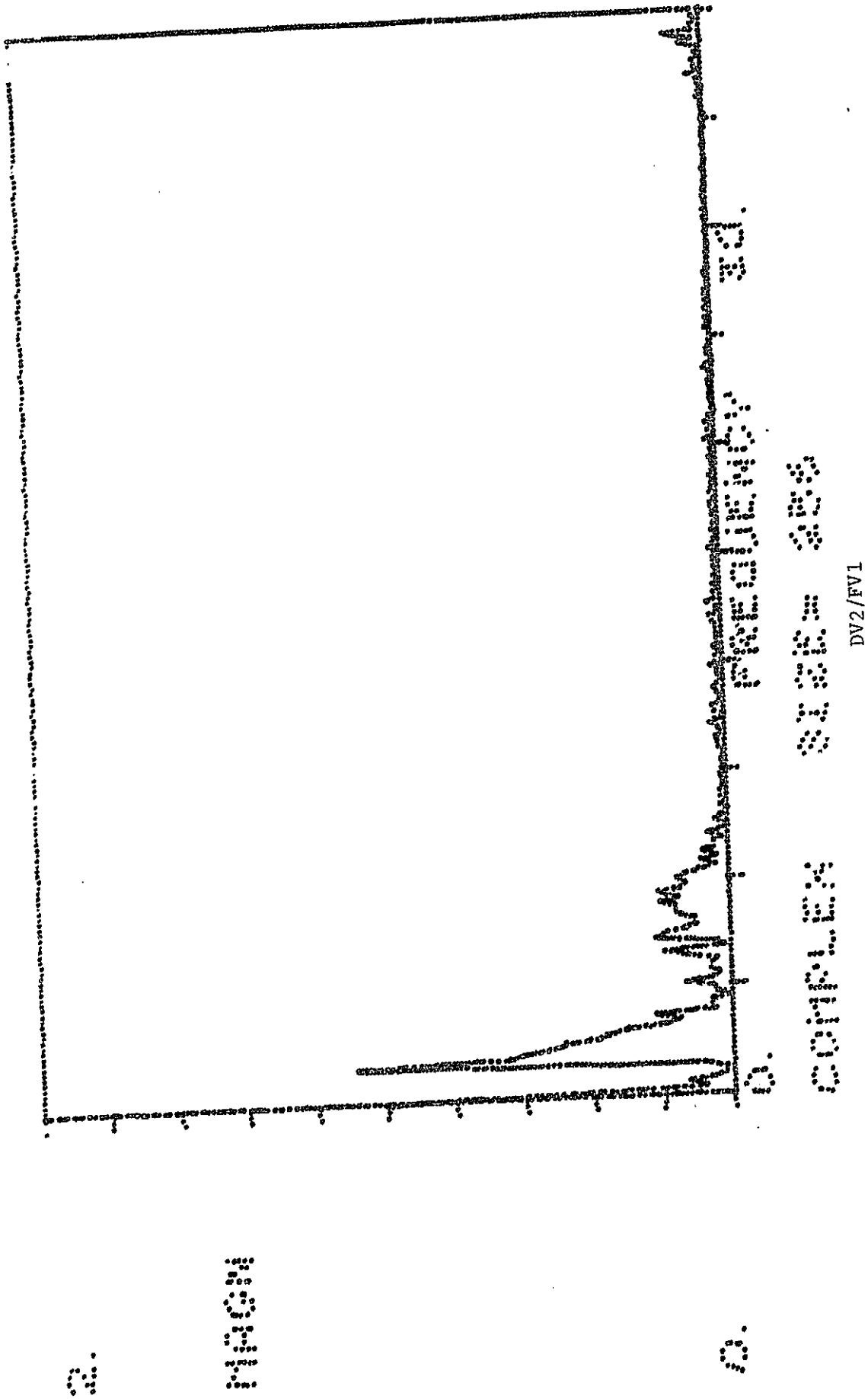


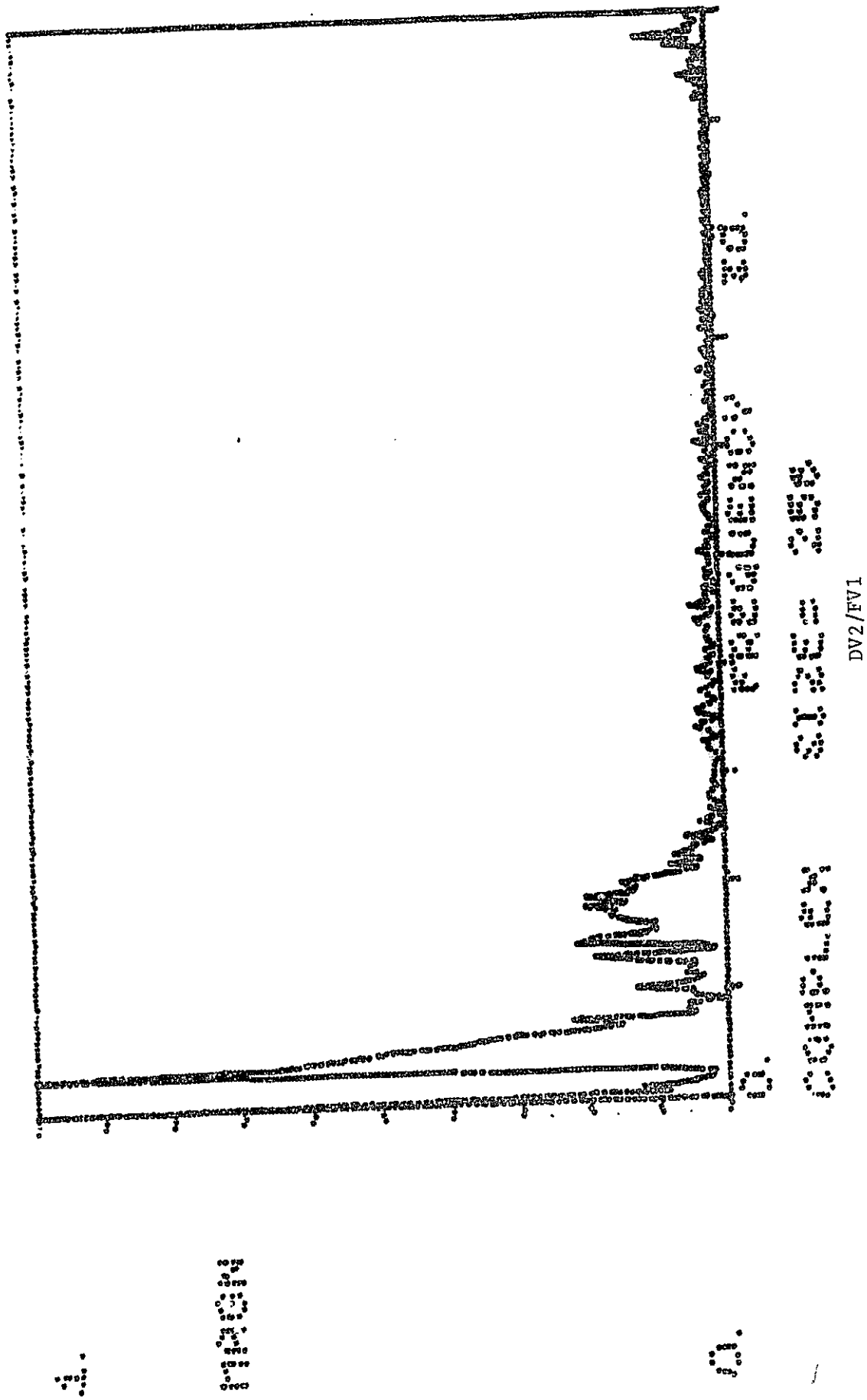
FV2/FV1

FV4/FV1



DV1/FV1


DV2/FV1



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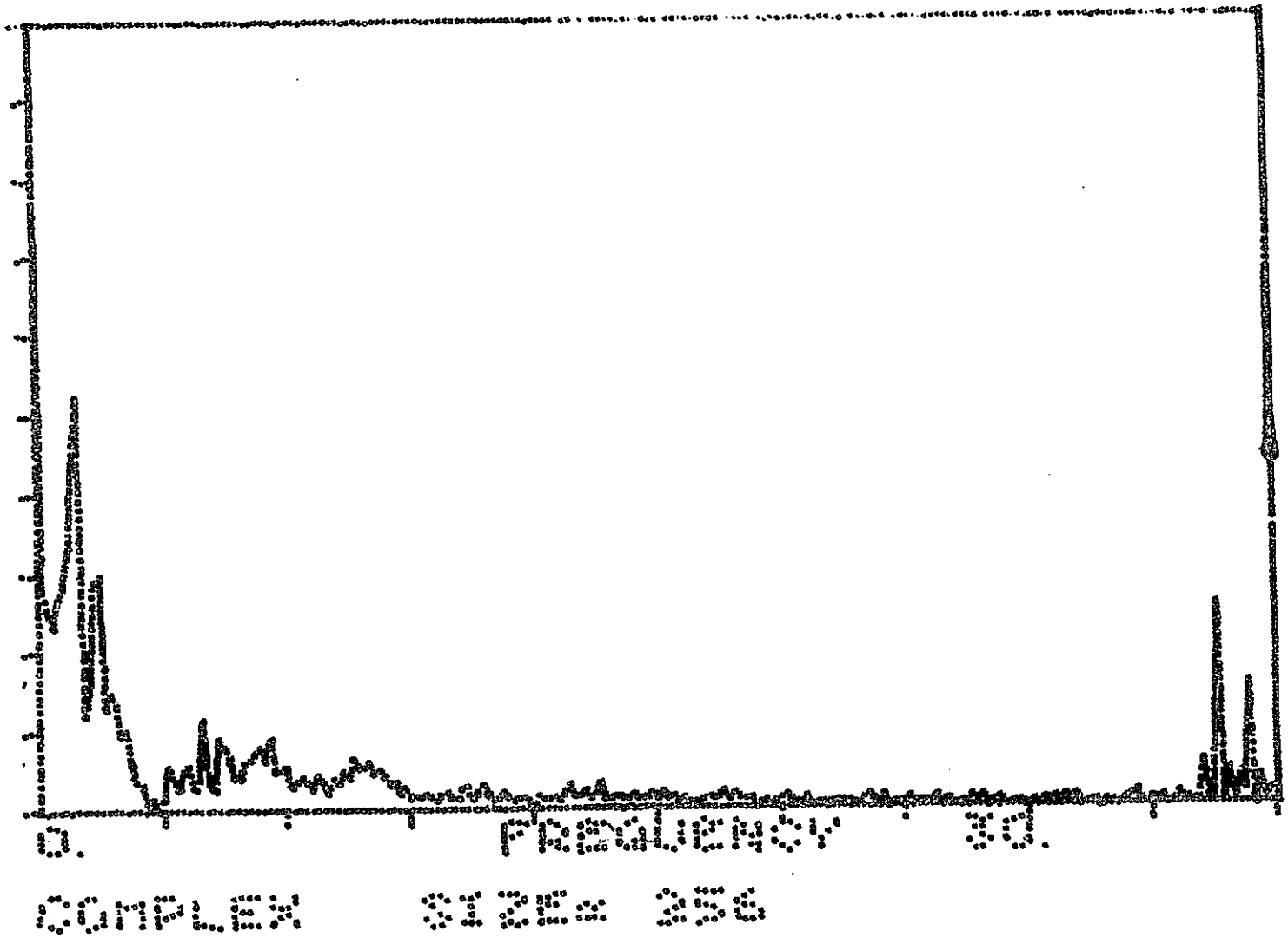

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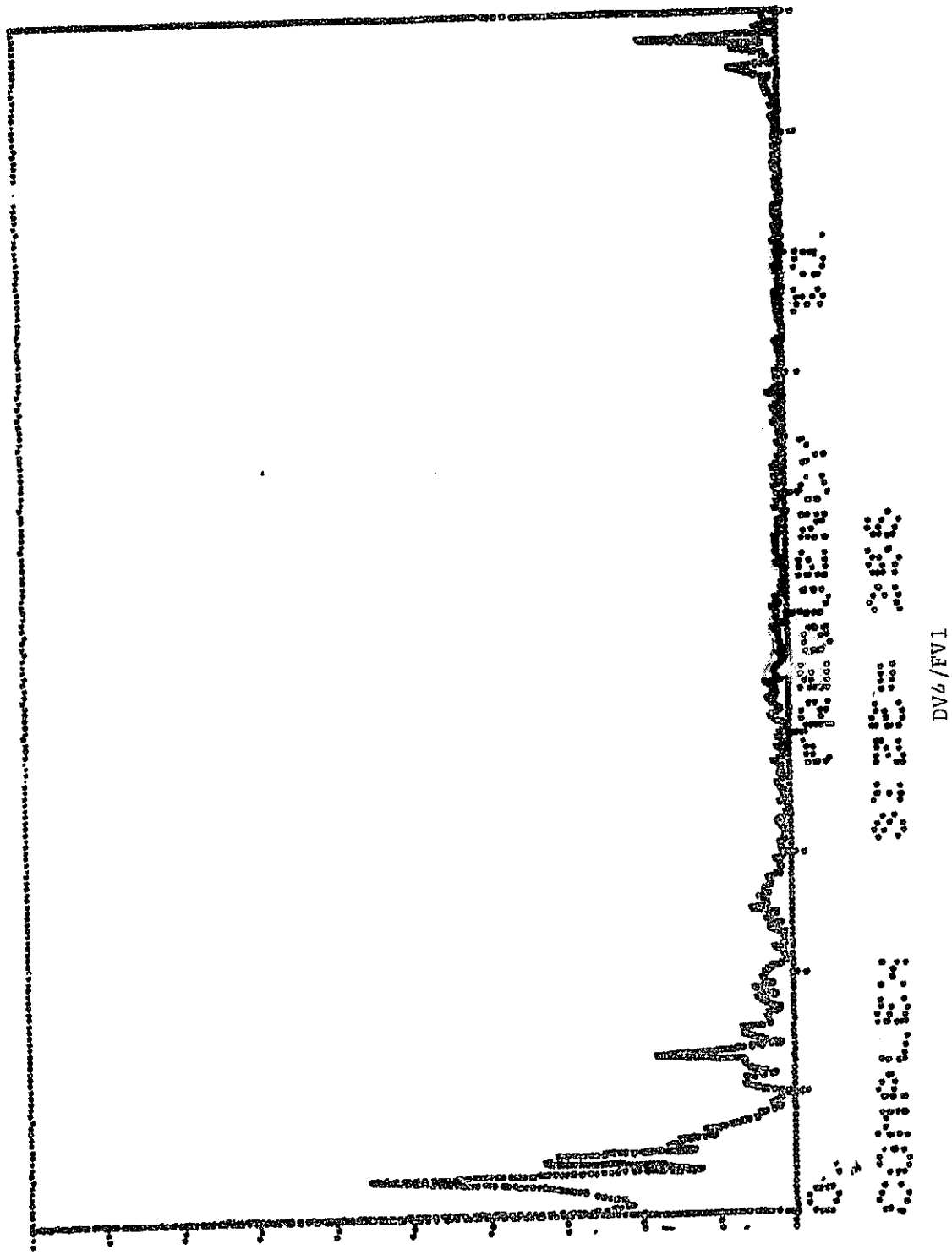
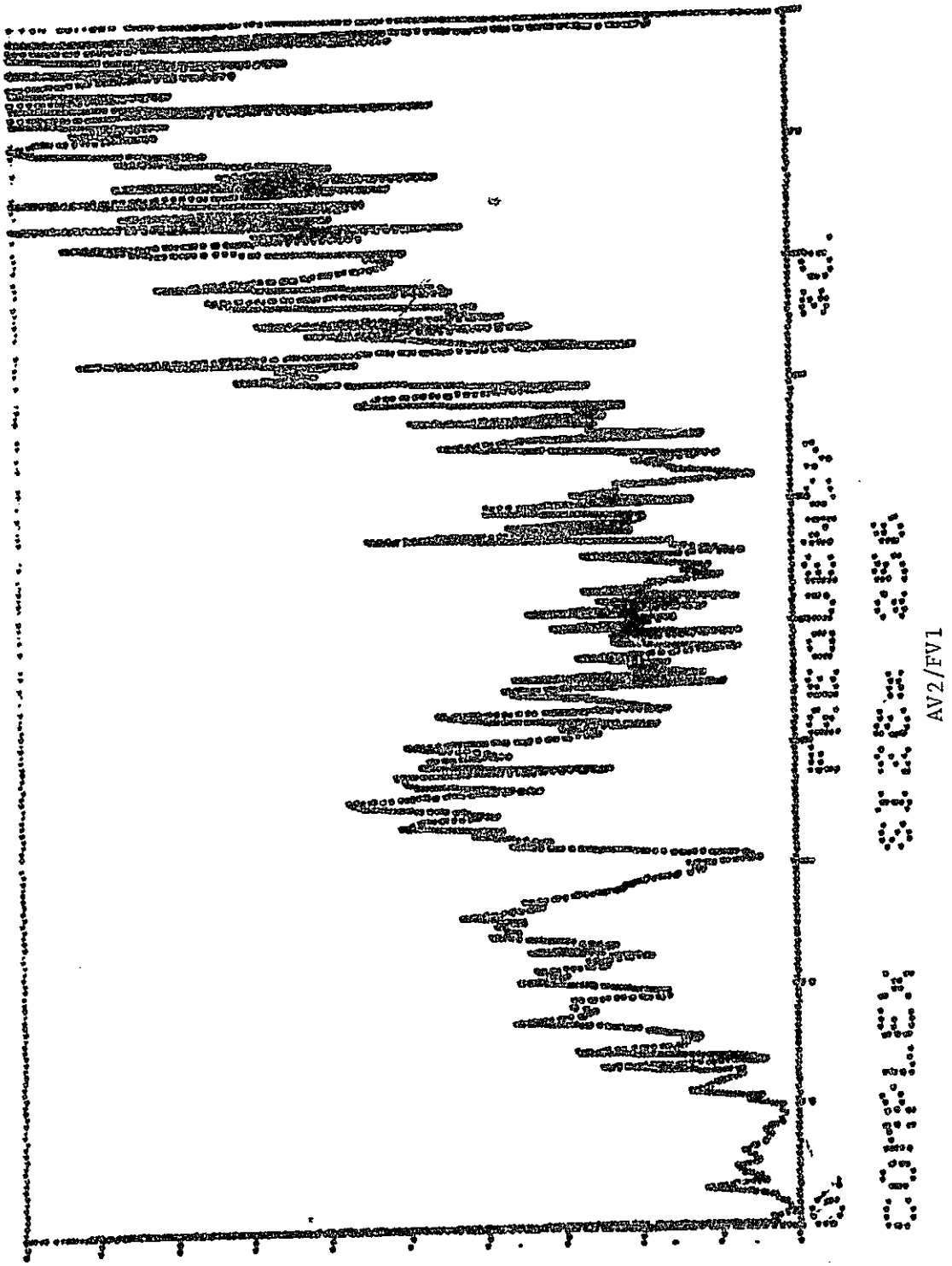


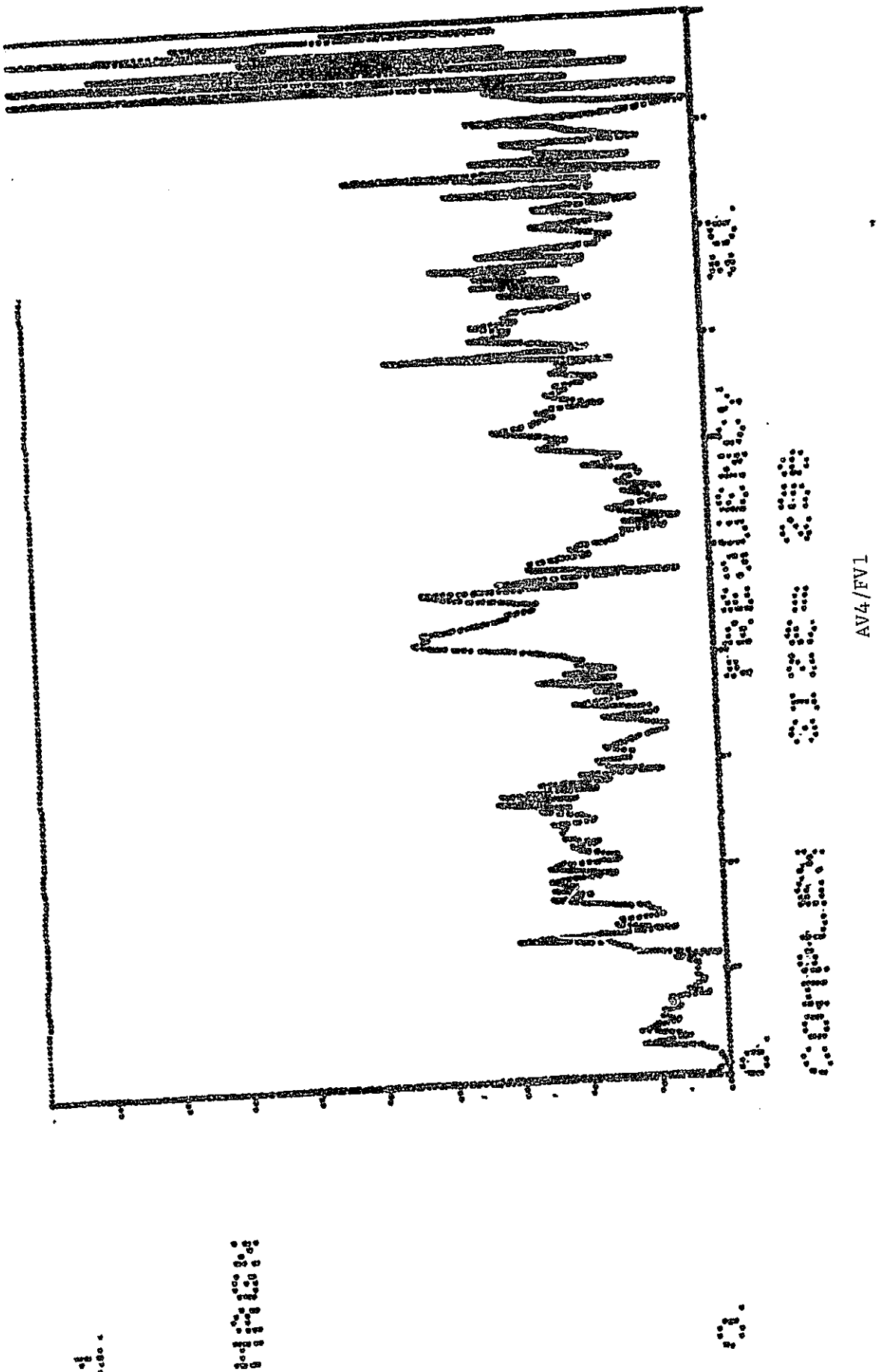
DV4/FV1

AV1/FV1

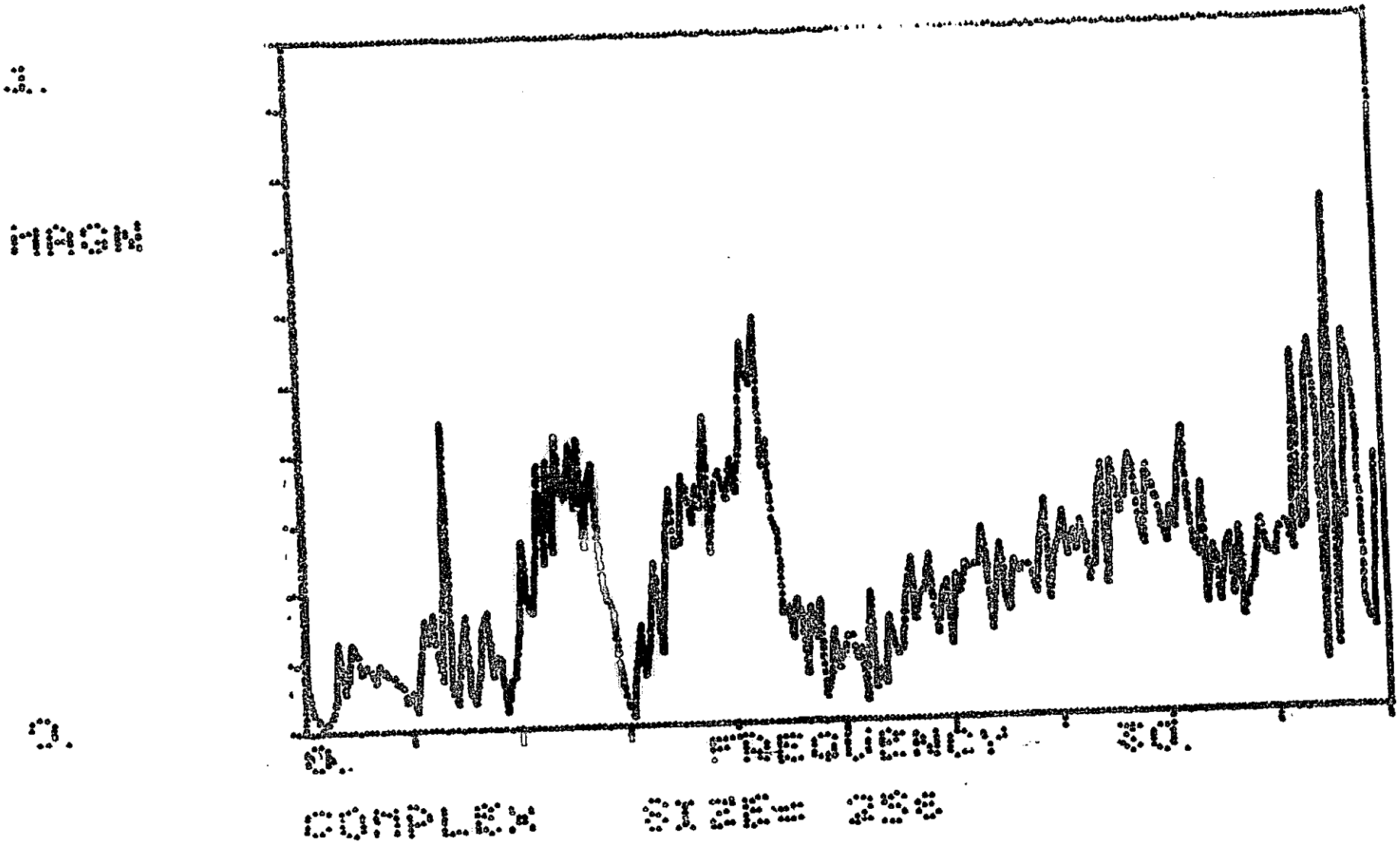
AV2/FV1


AV2/FV1

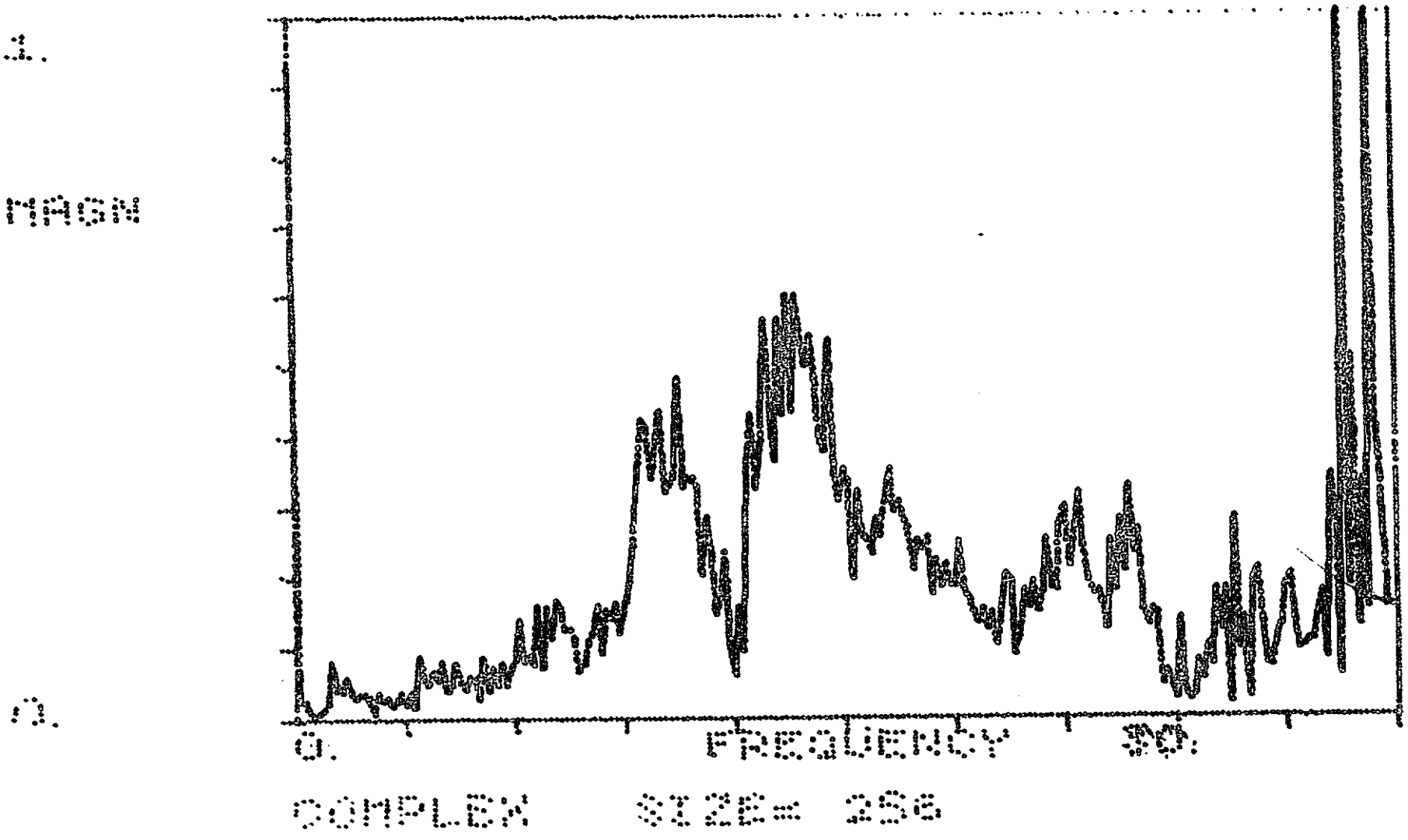
AV3/FV1


AV4/FV1

AV5/FV1

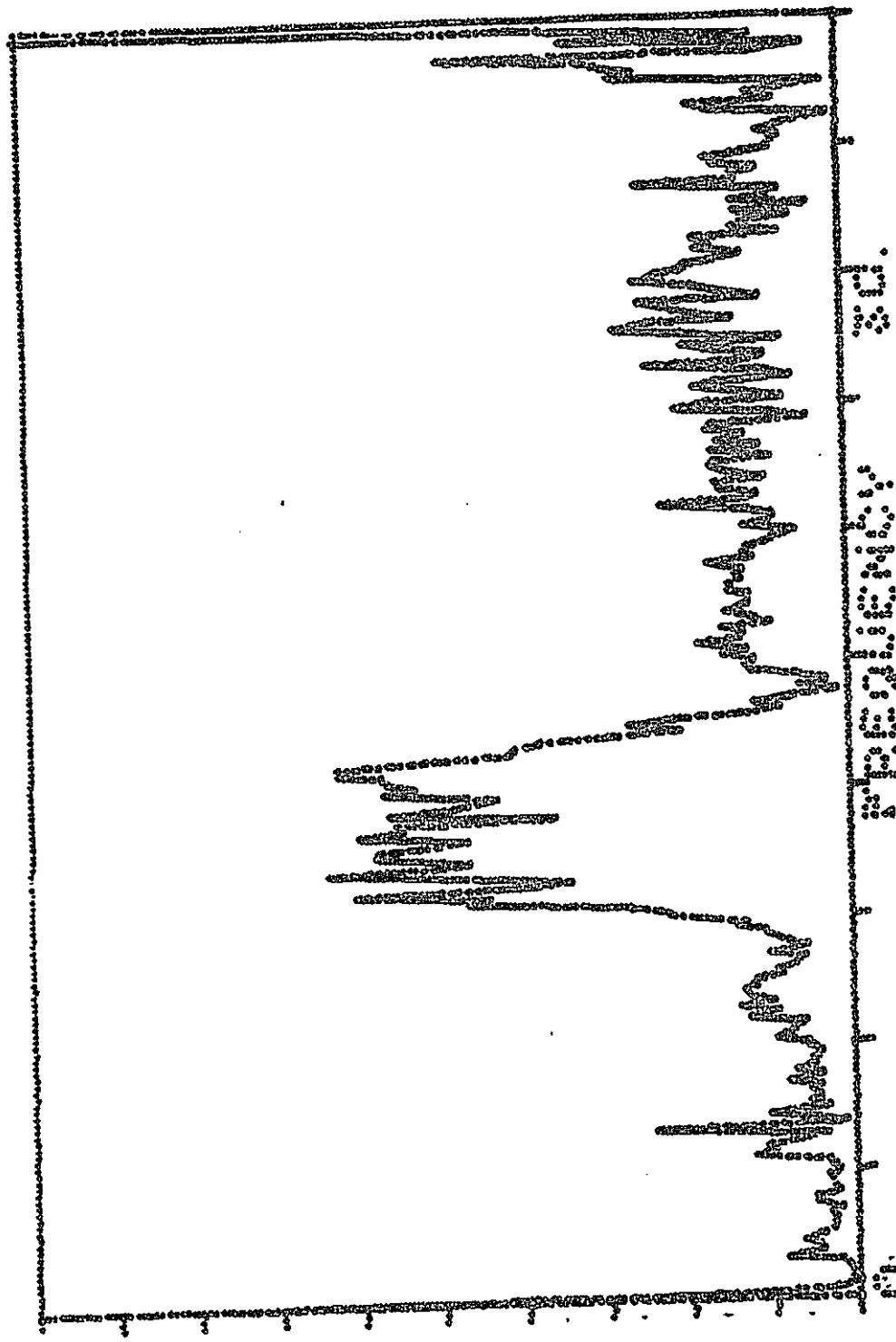


AV6/FV1



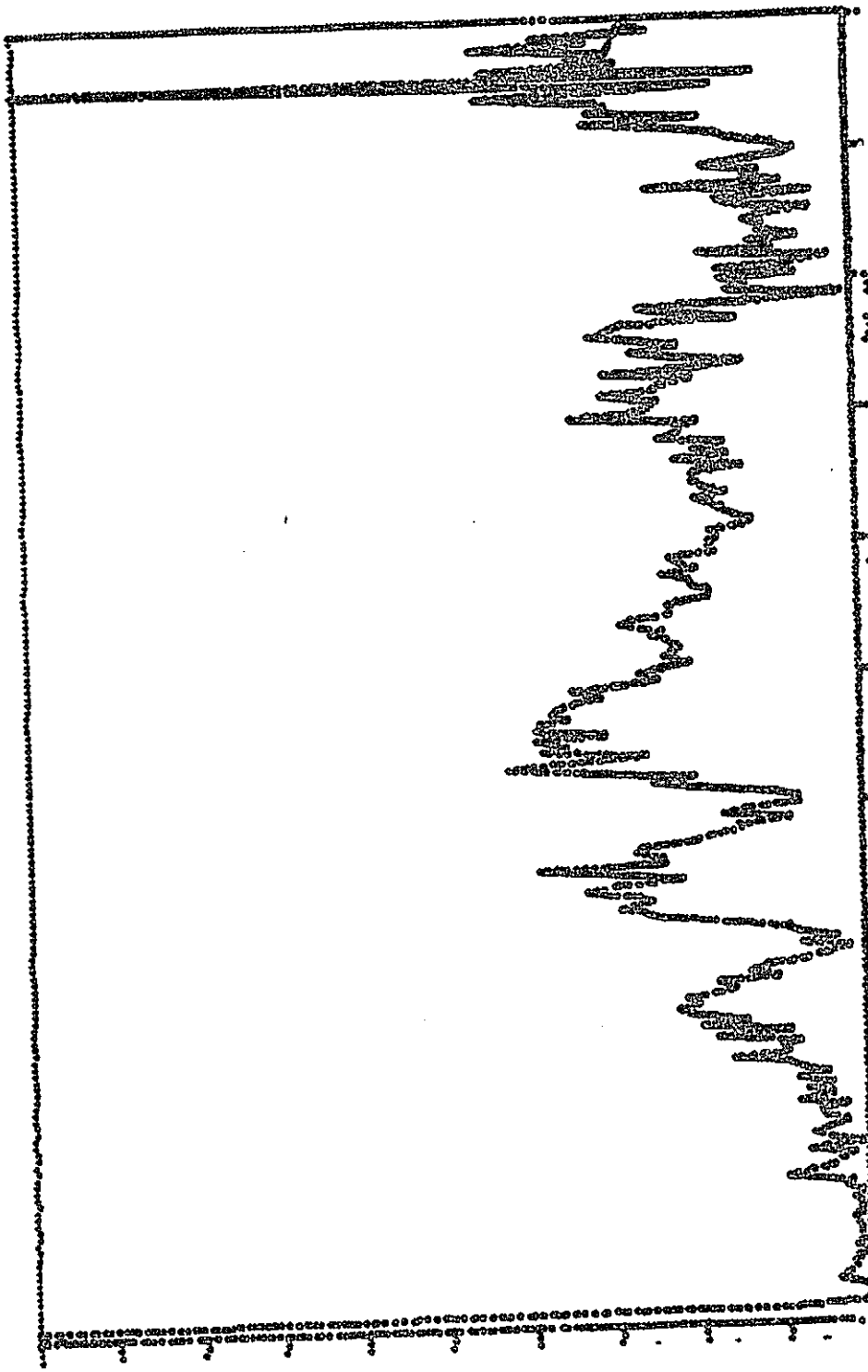
AL1/FV1

AL2/FV1

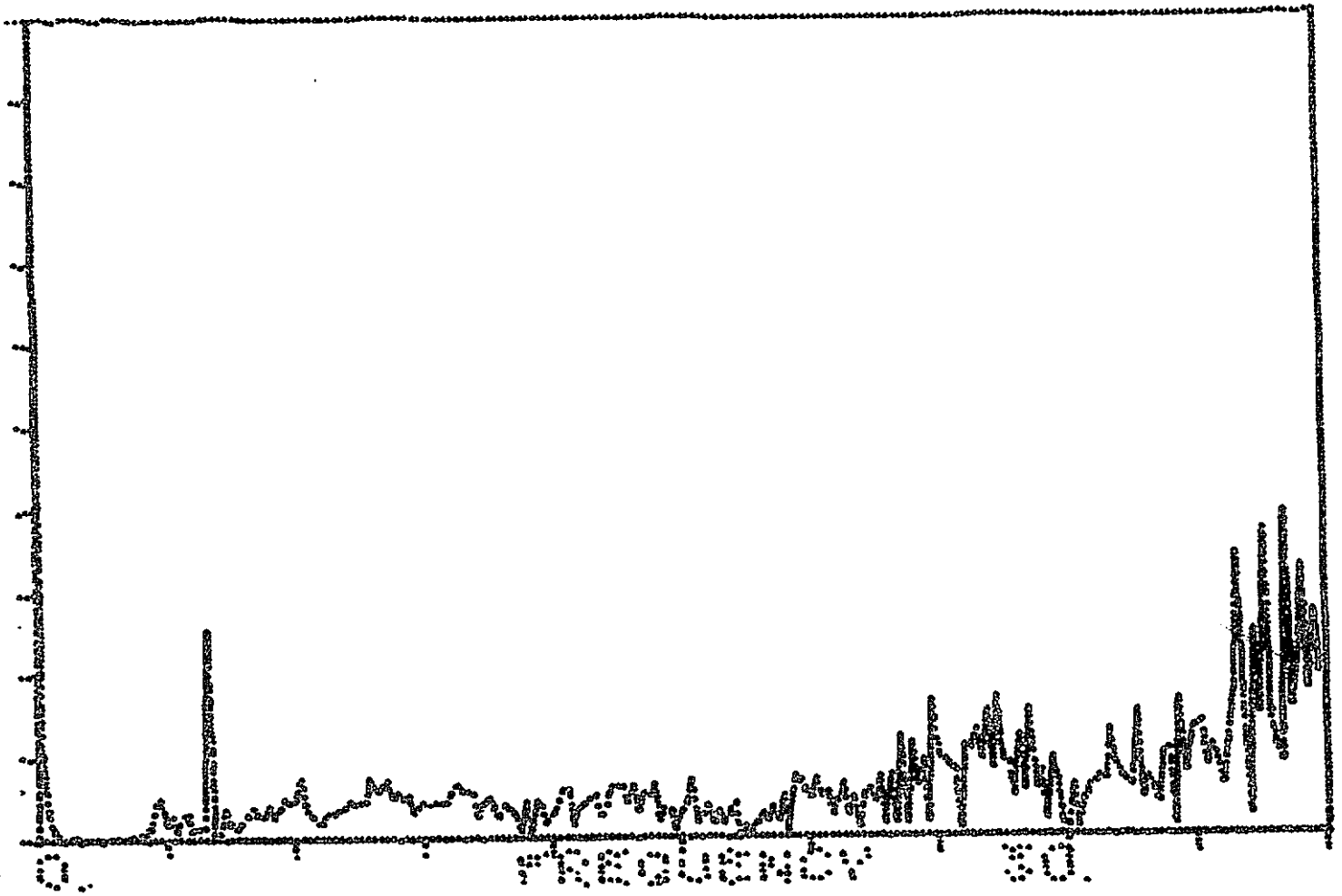


AL3/FV1

AL6/FV1



AL7/FV1



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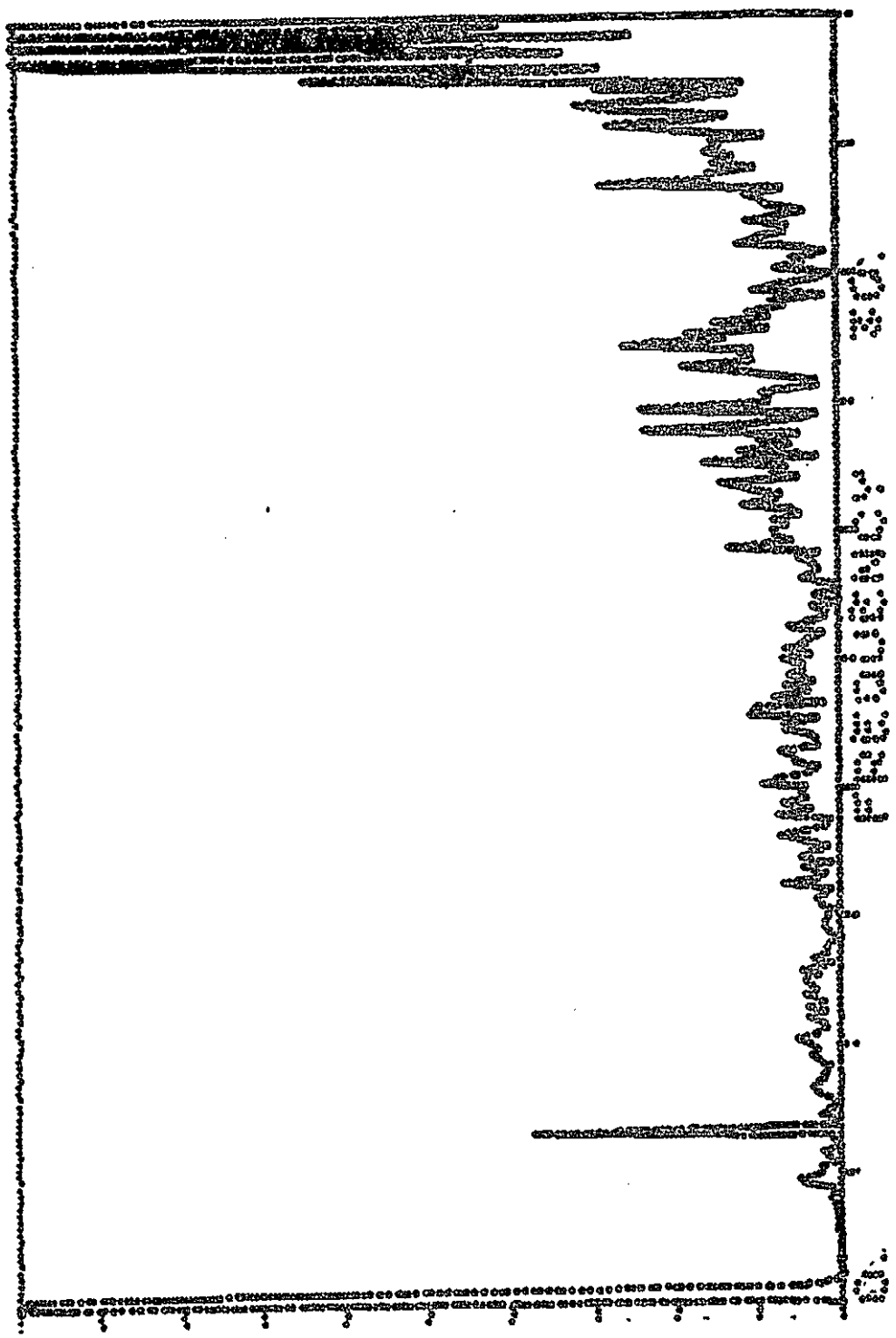
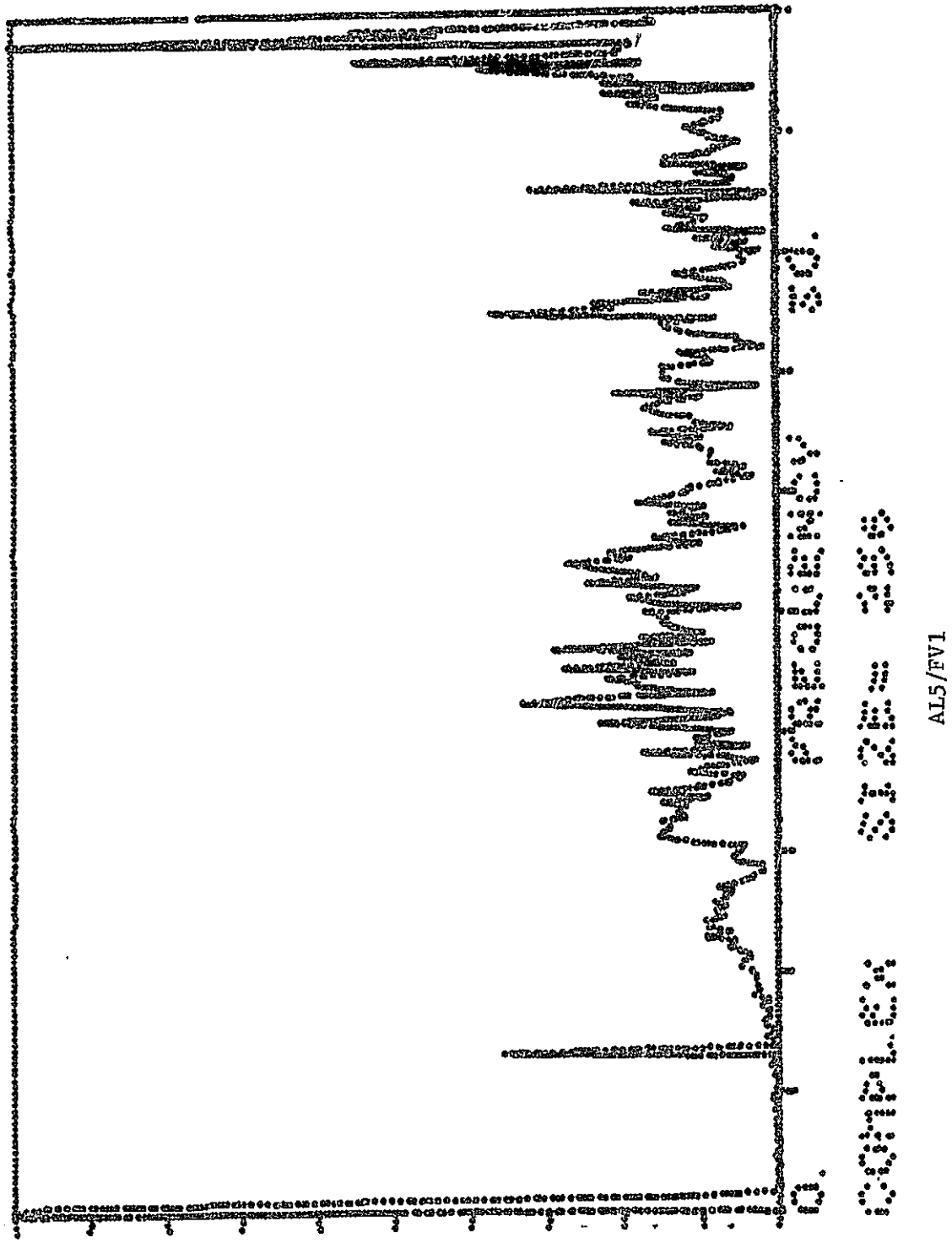
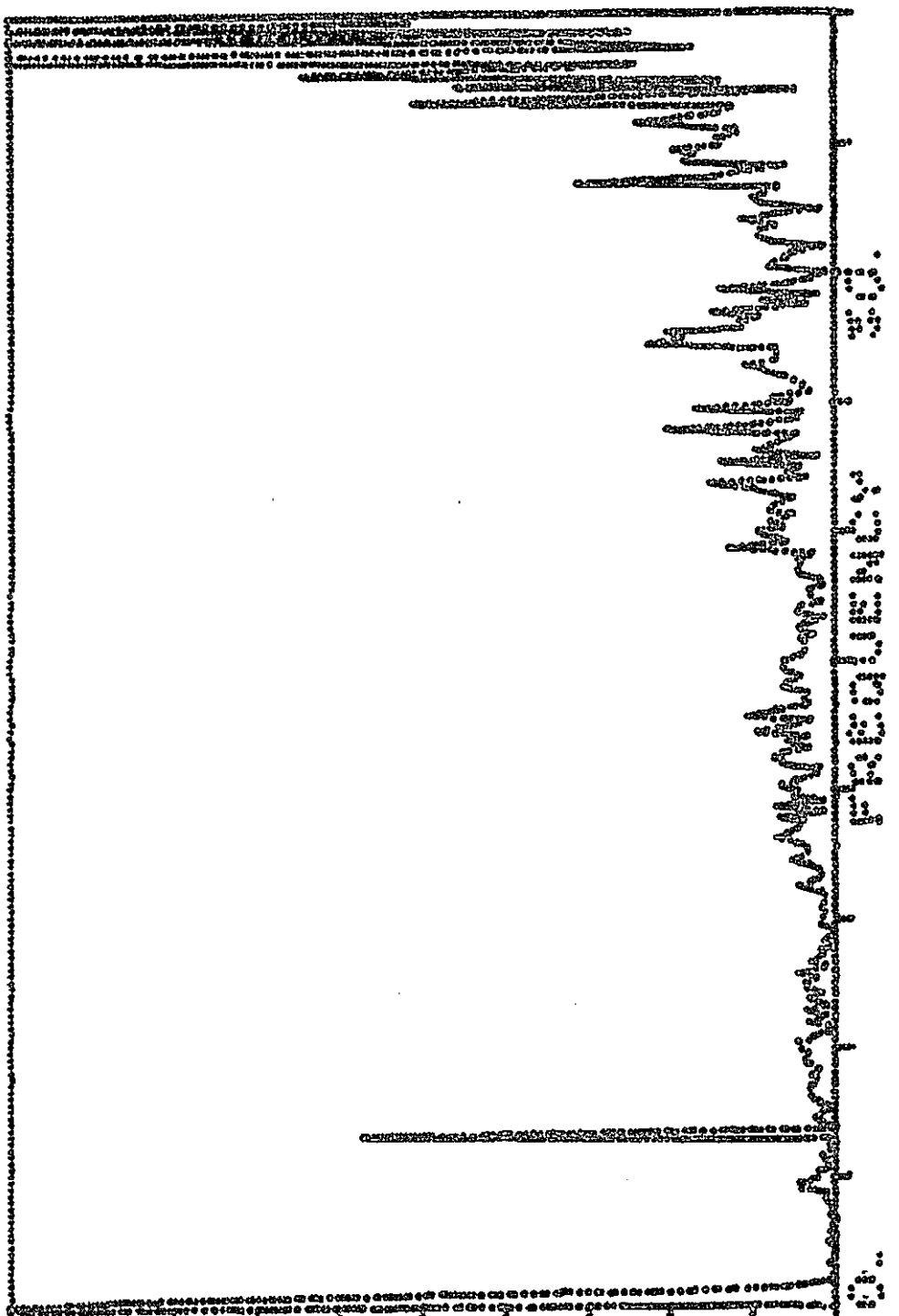


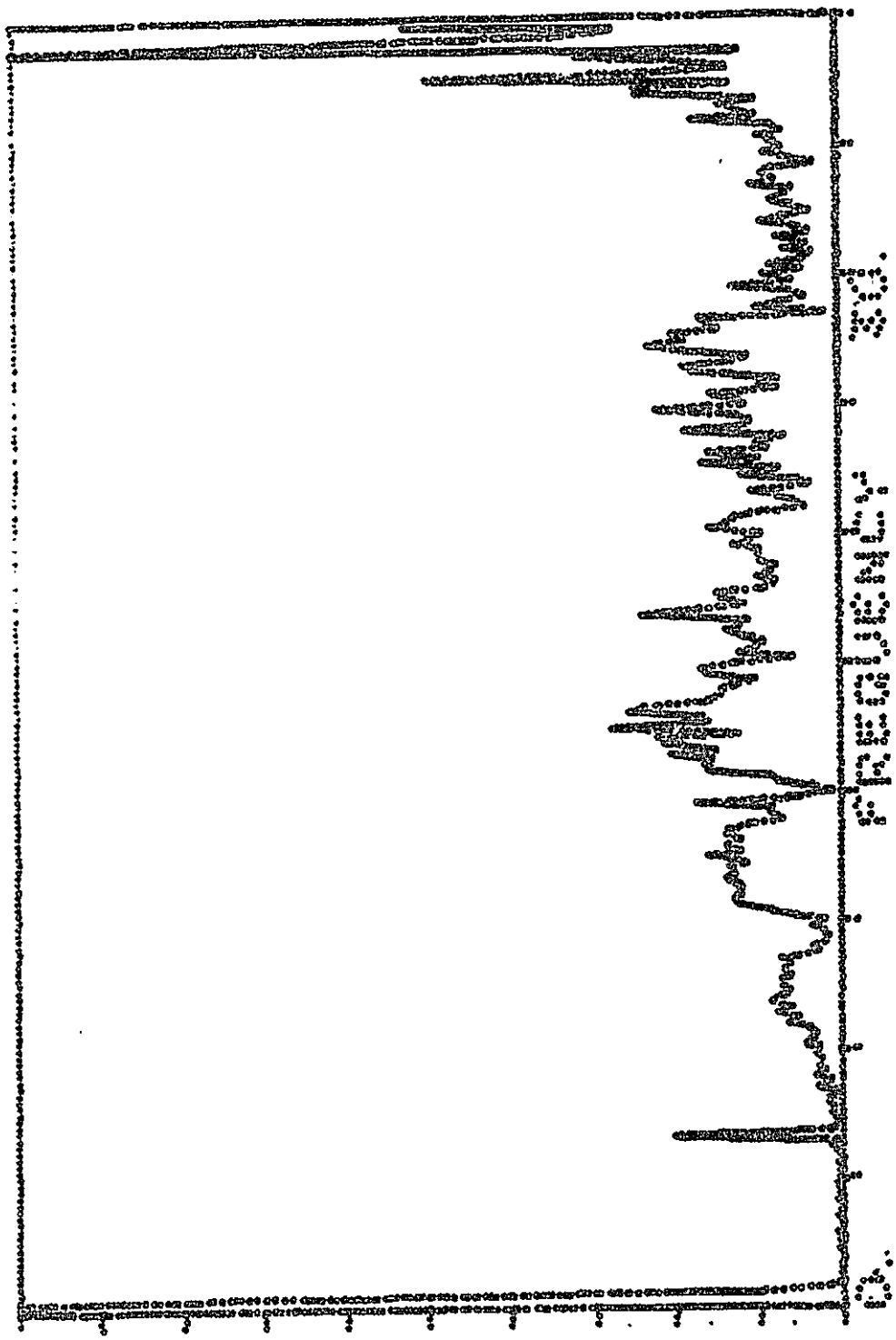
A14/FV1



AL5/FV1

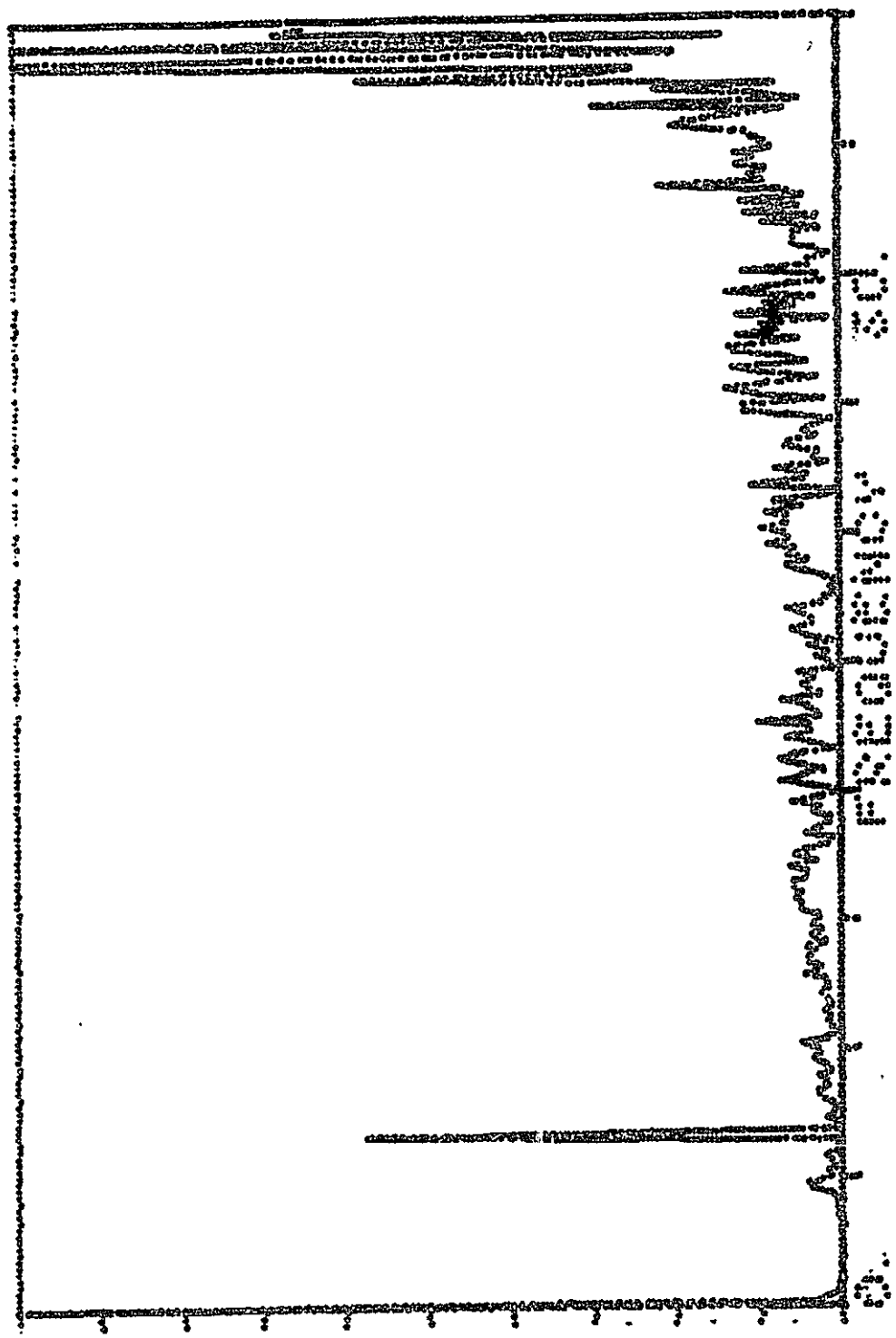


AL8/FV1



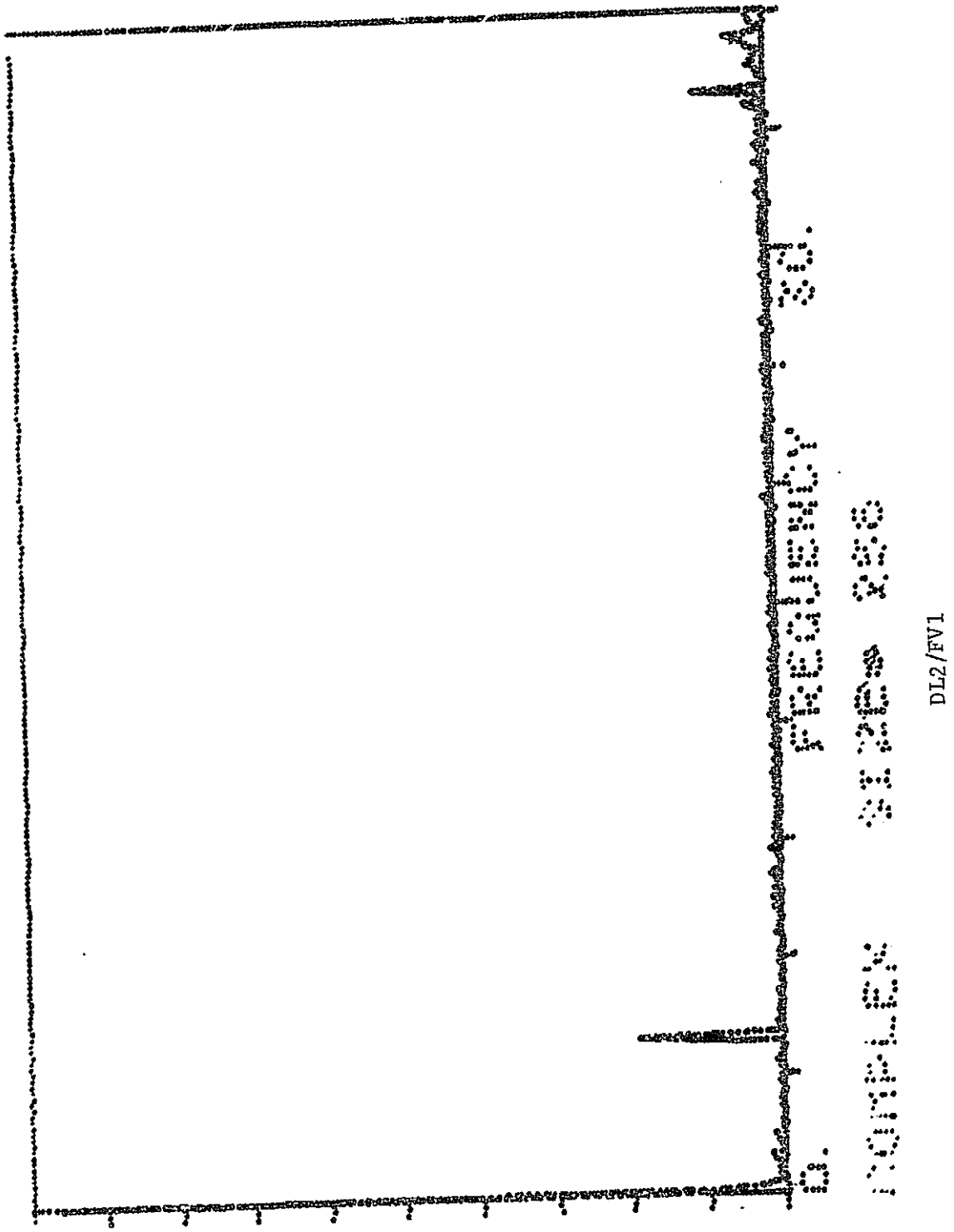
AL9/FV1

AL10/FV1



AL12/FV1

DL1/FV1



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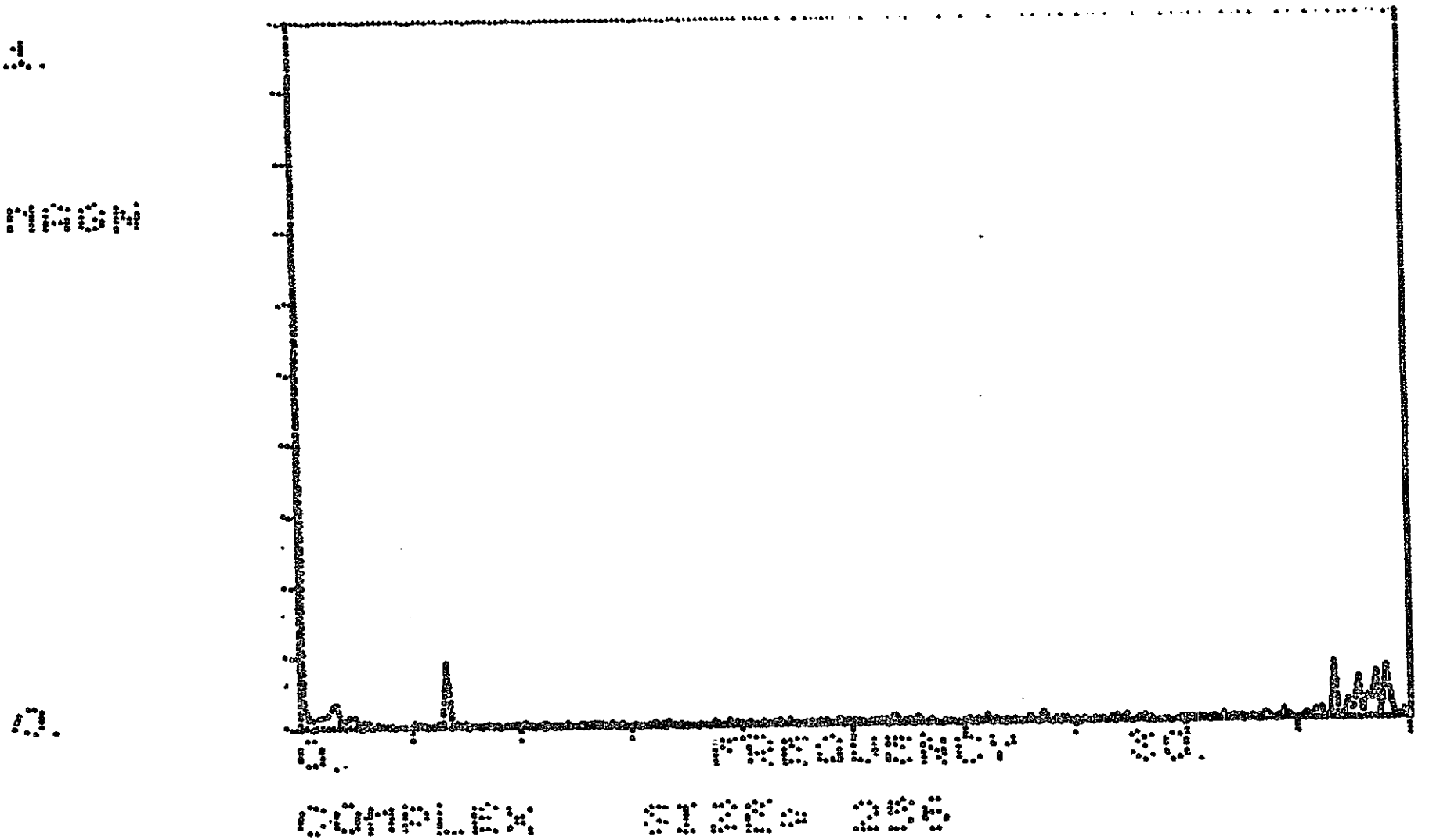

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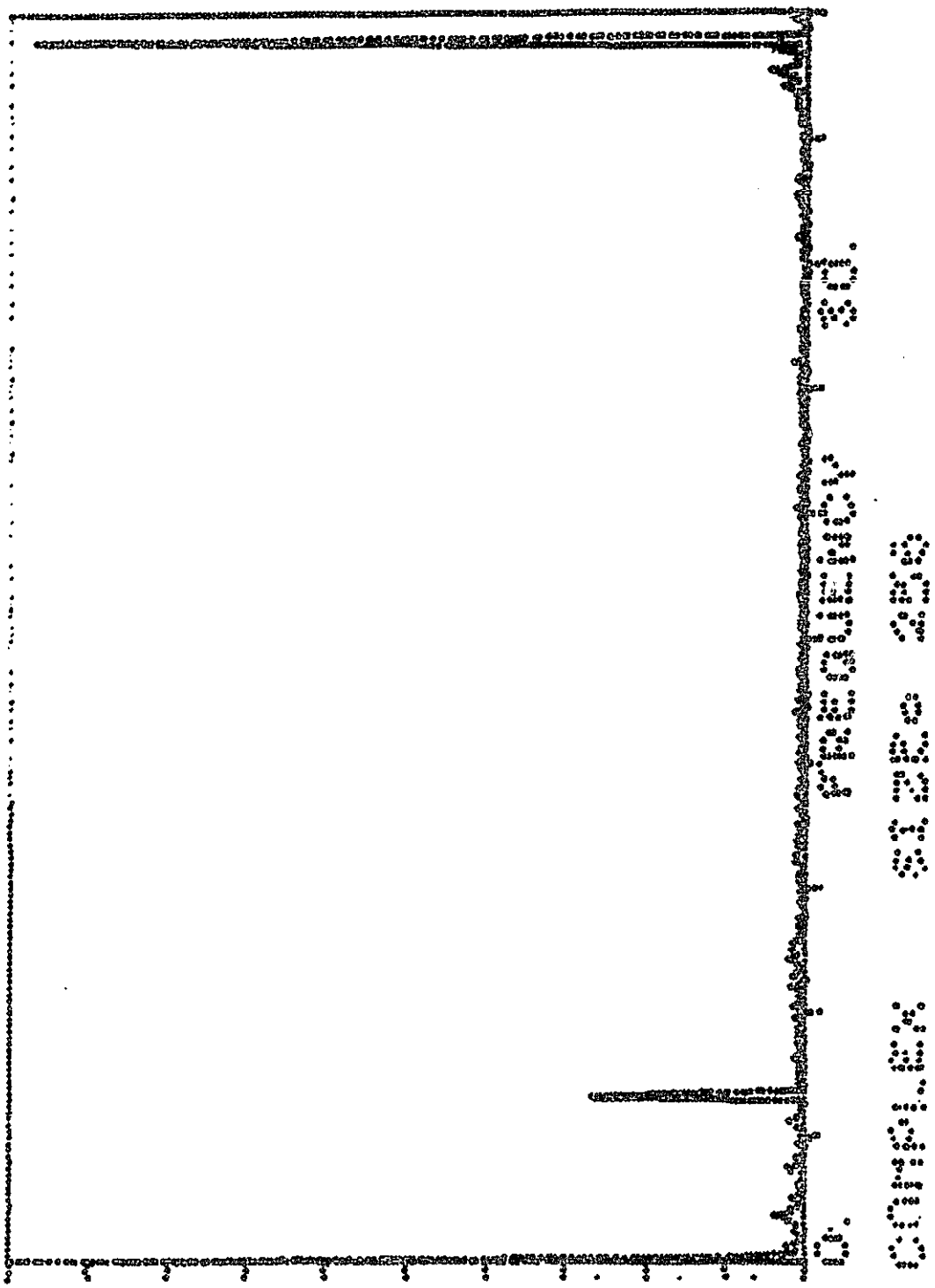

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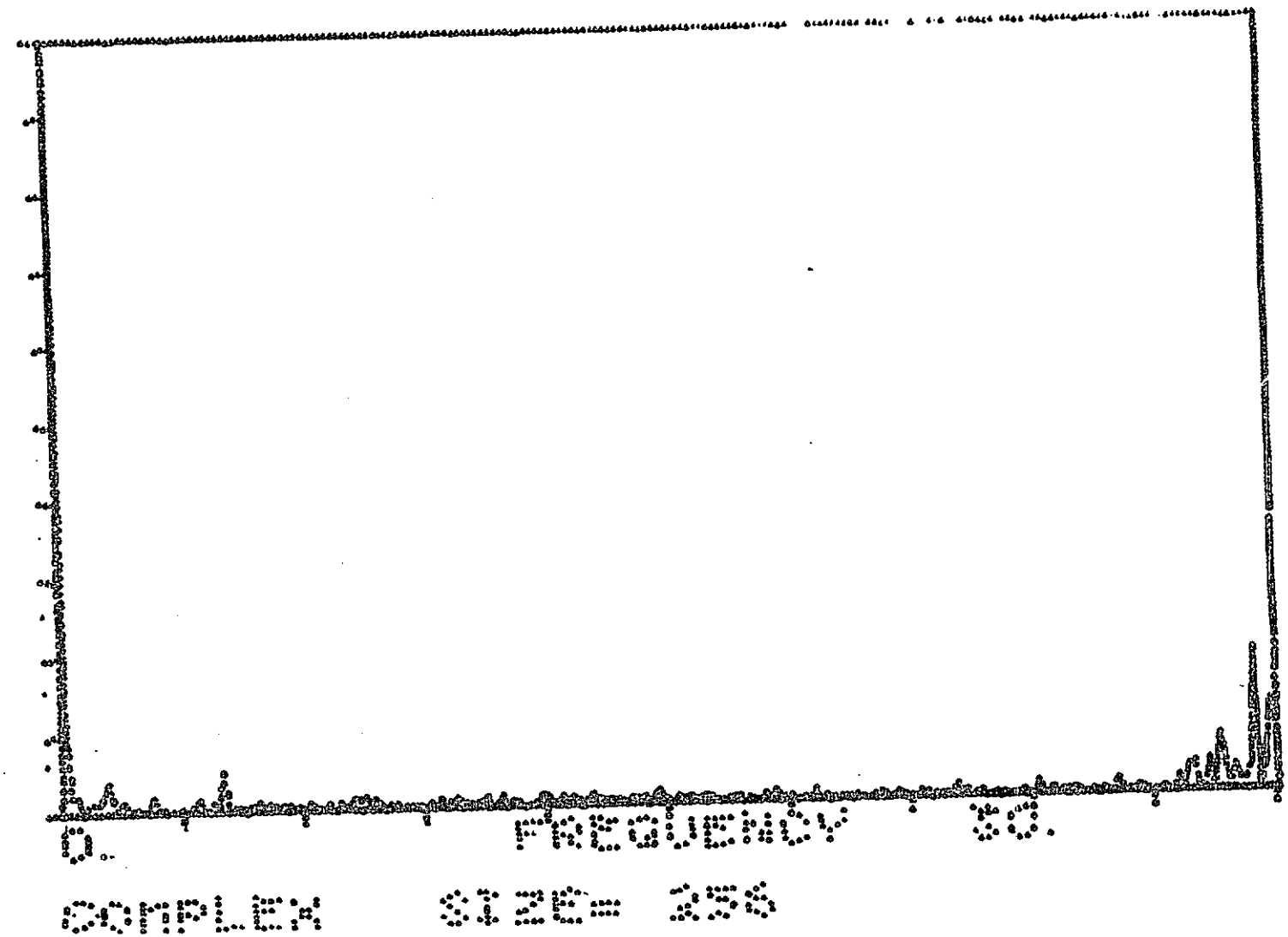

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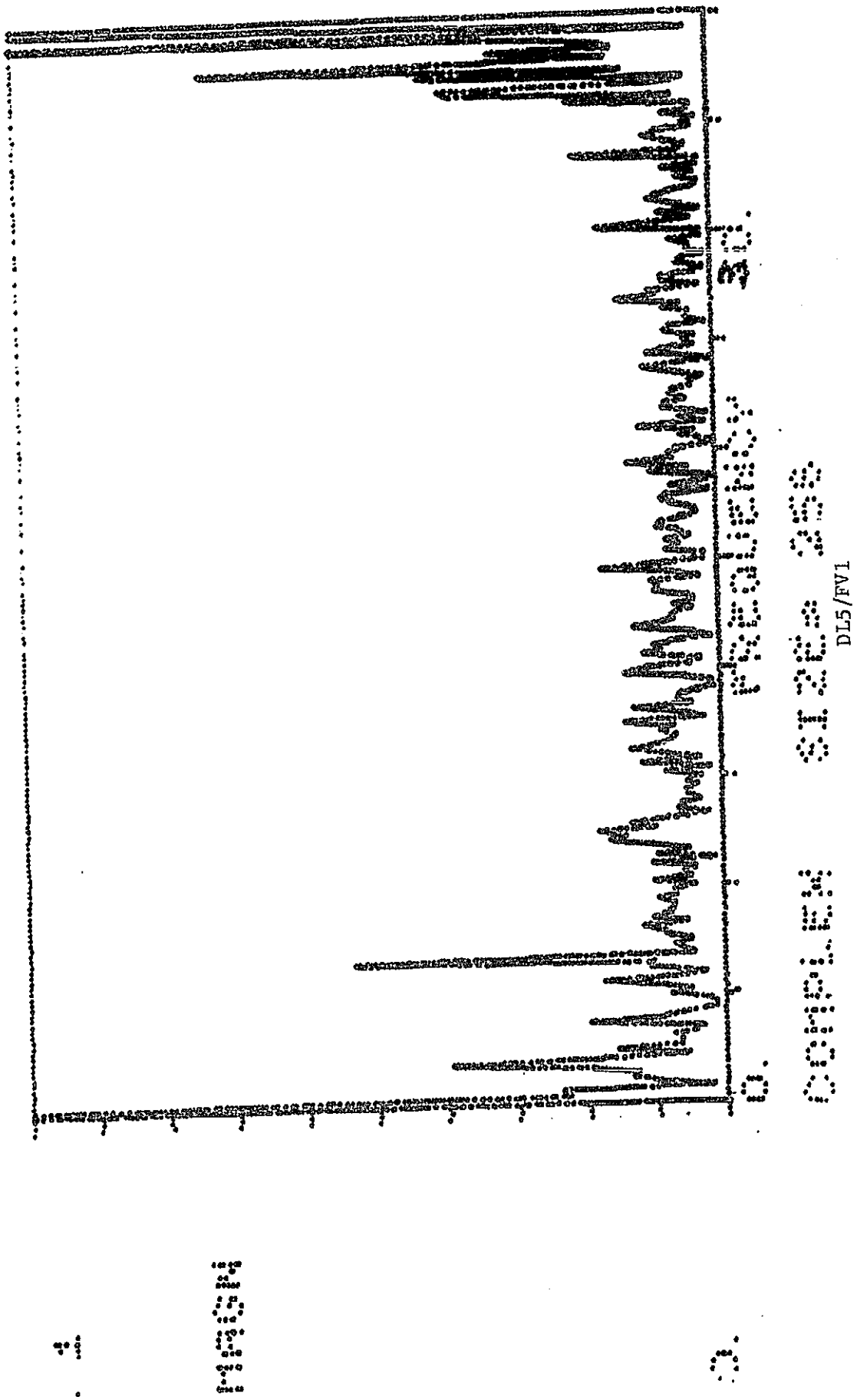
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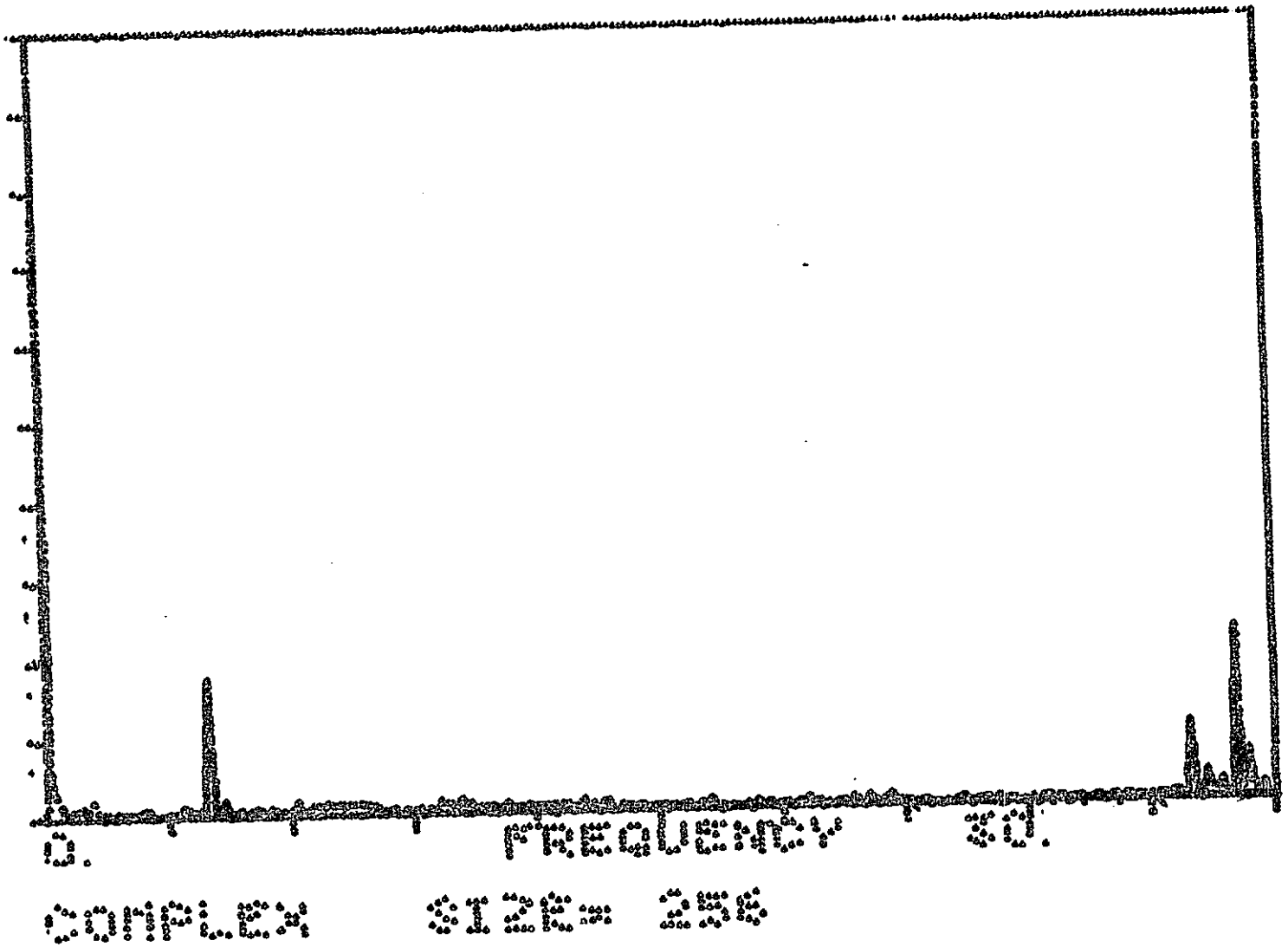

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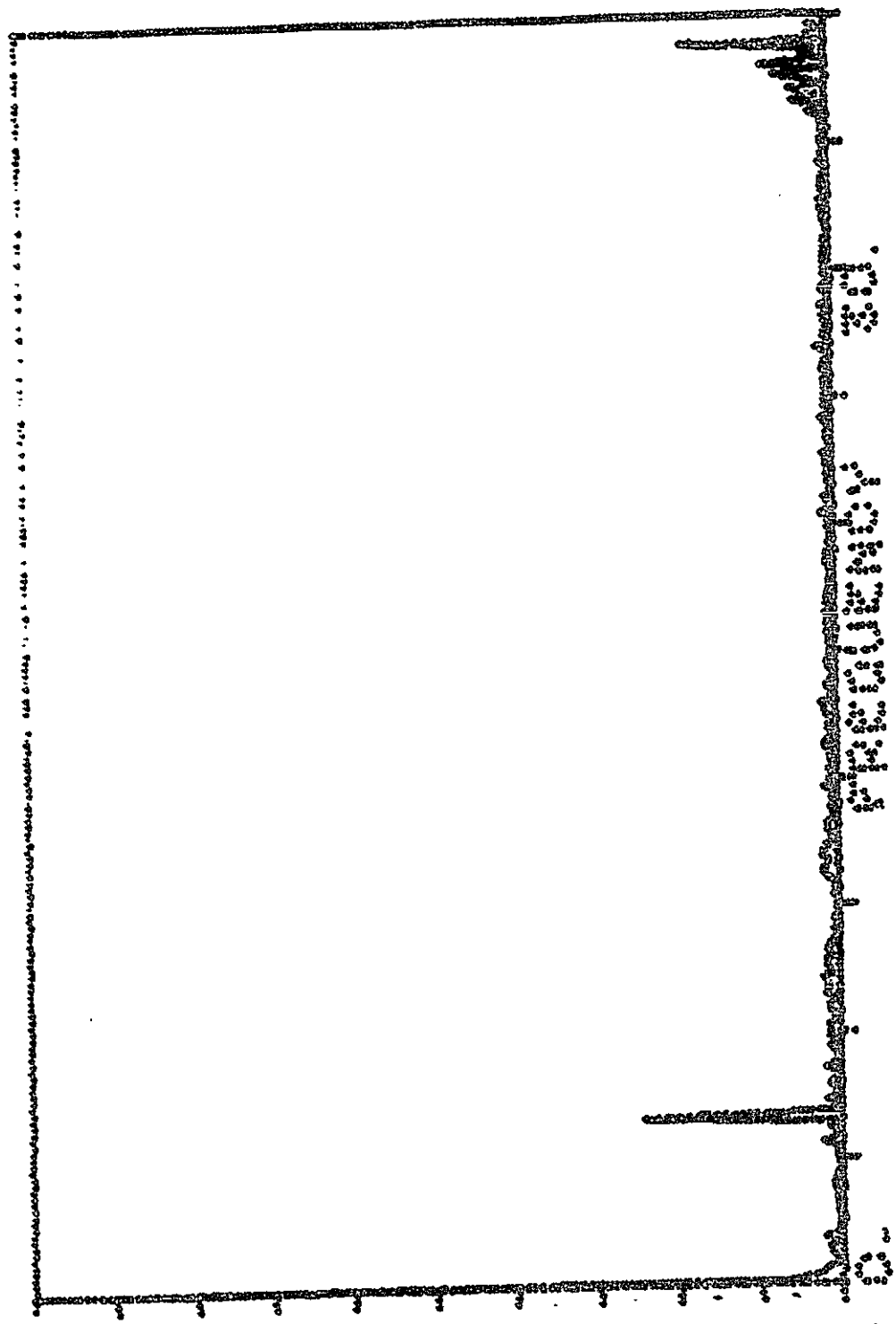

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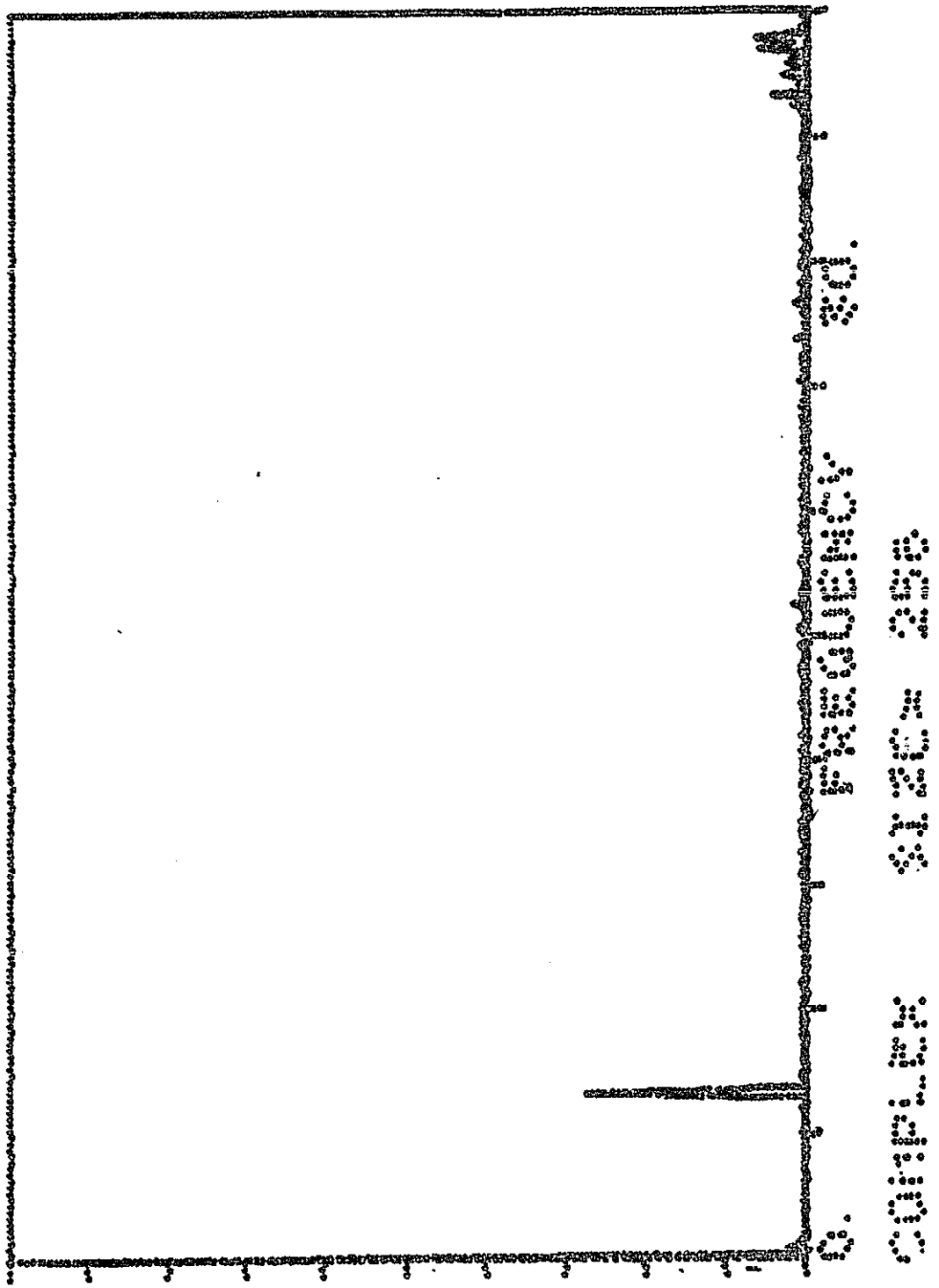

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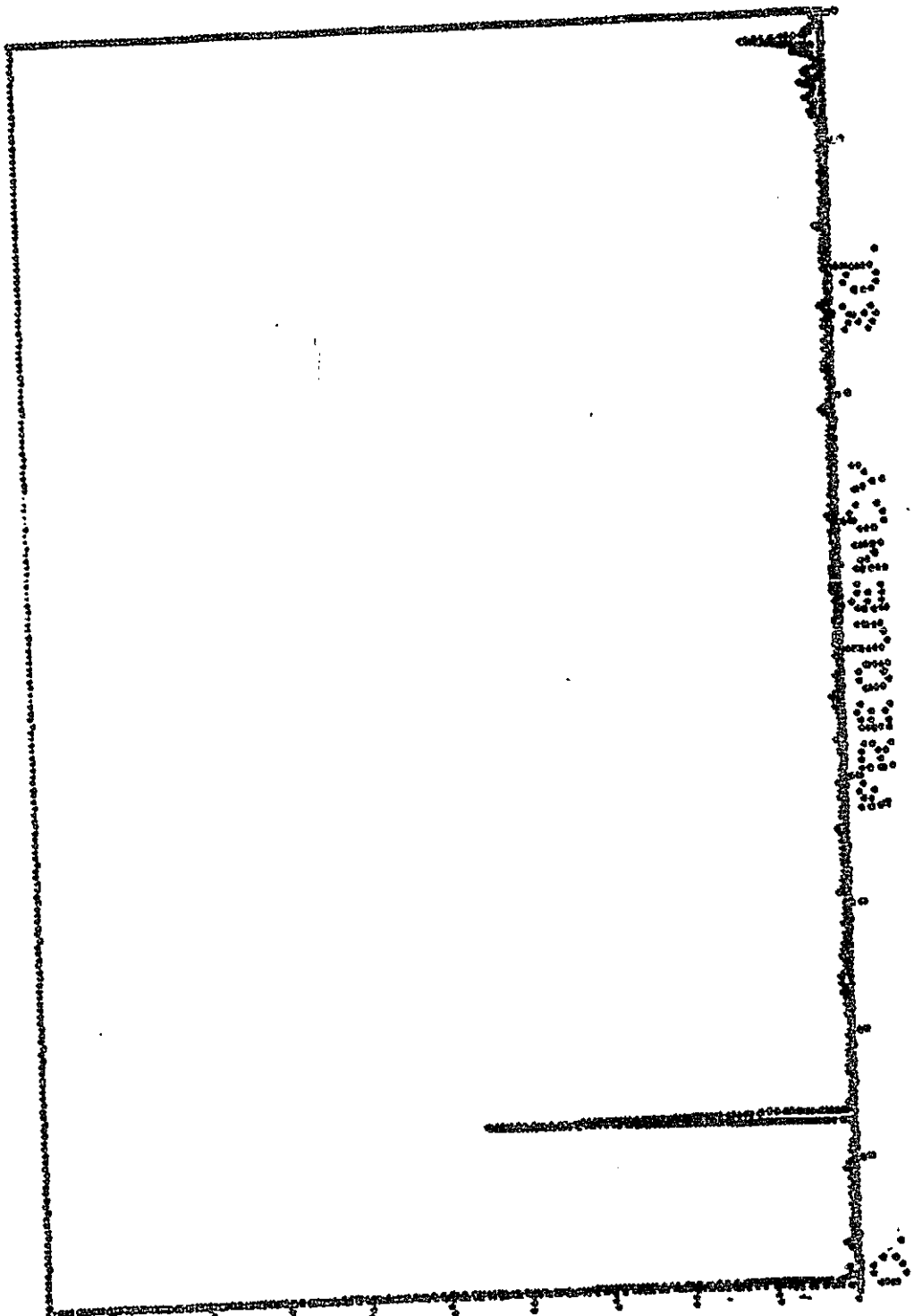
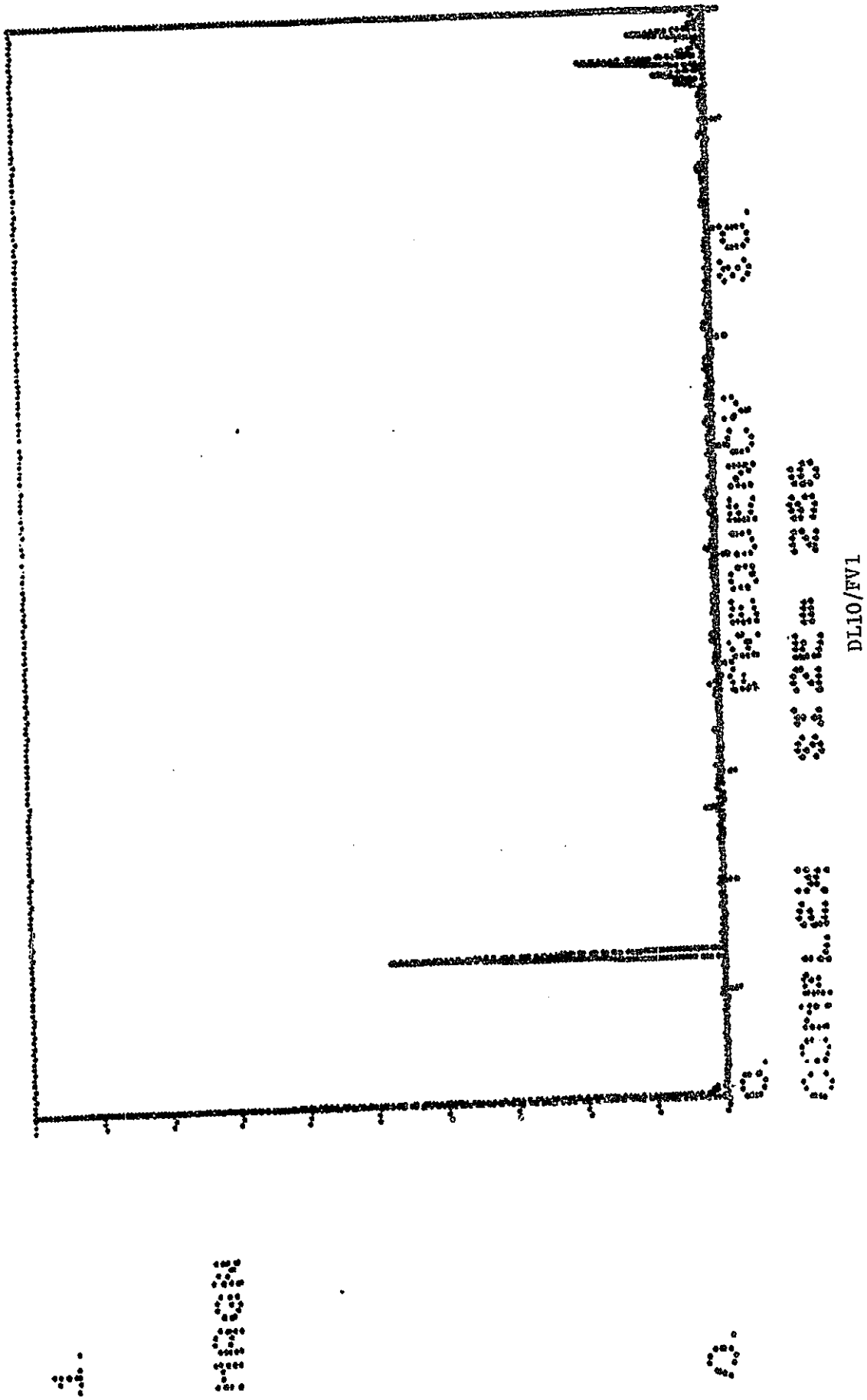
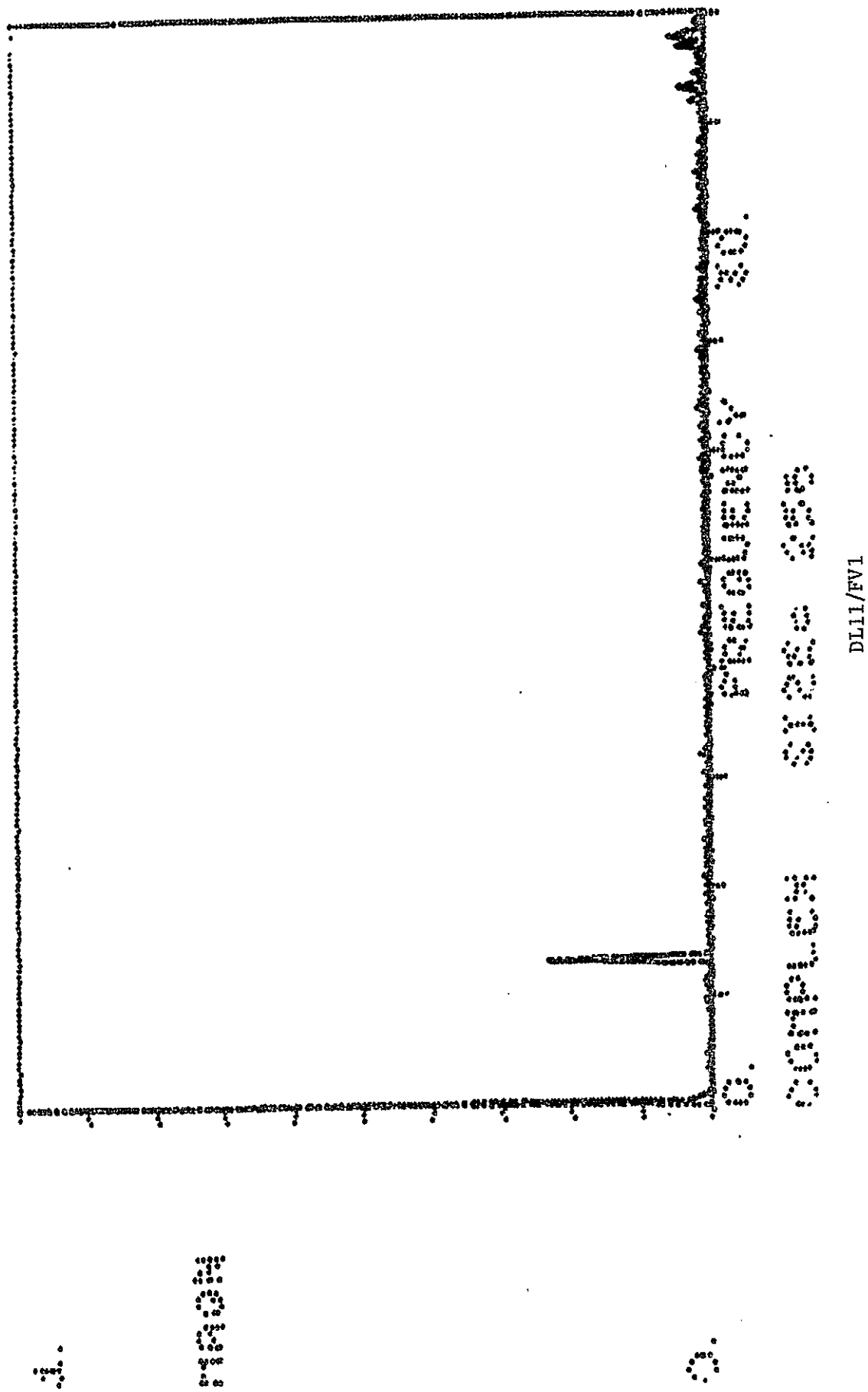


DL9/FV1



DL10/FV1



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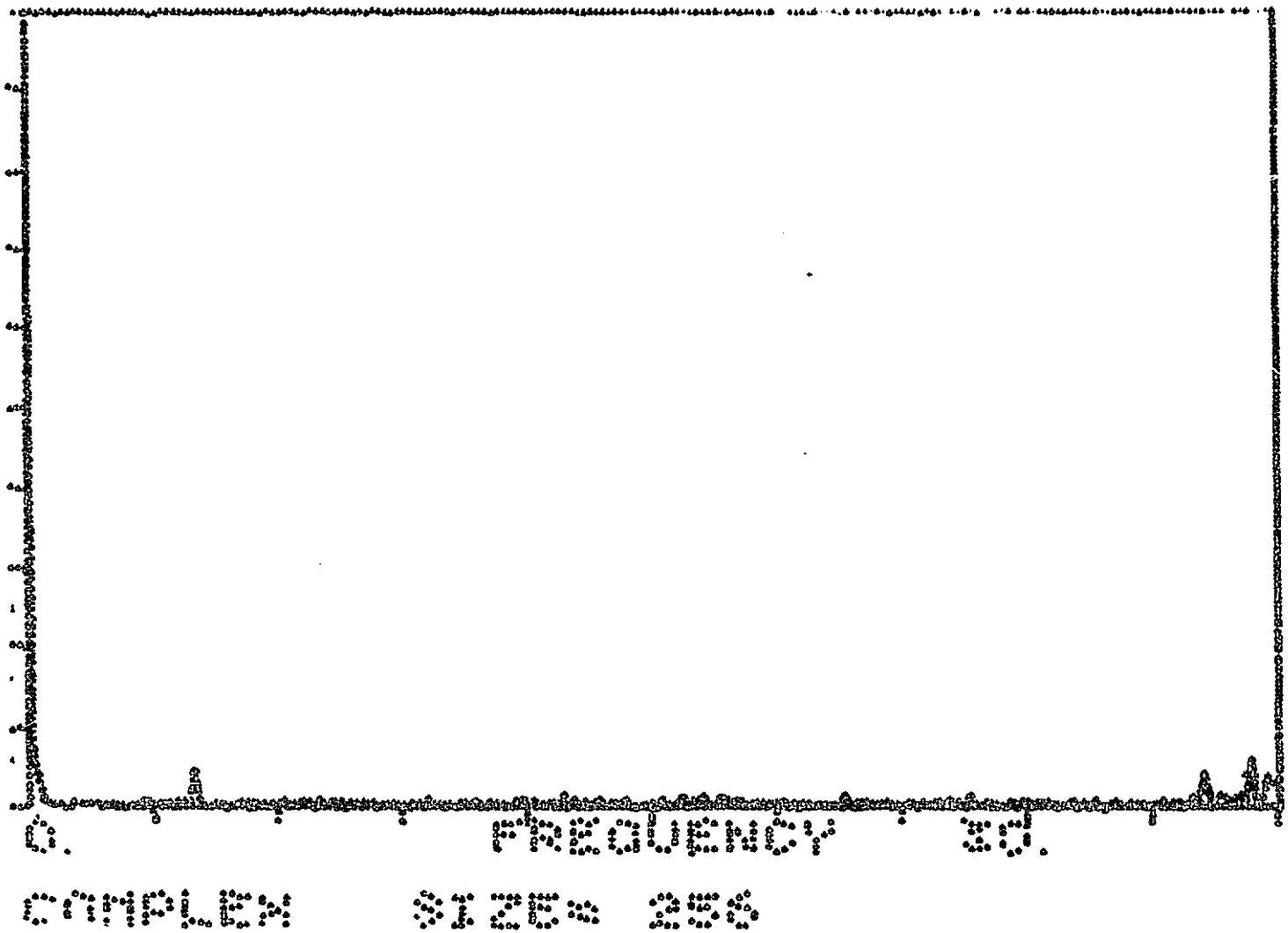

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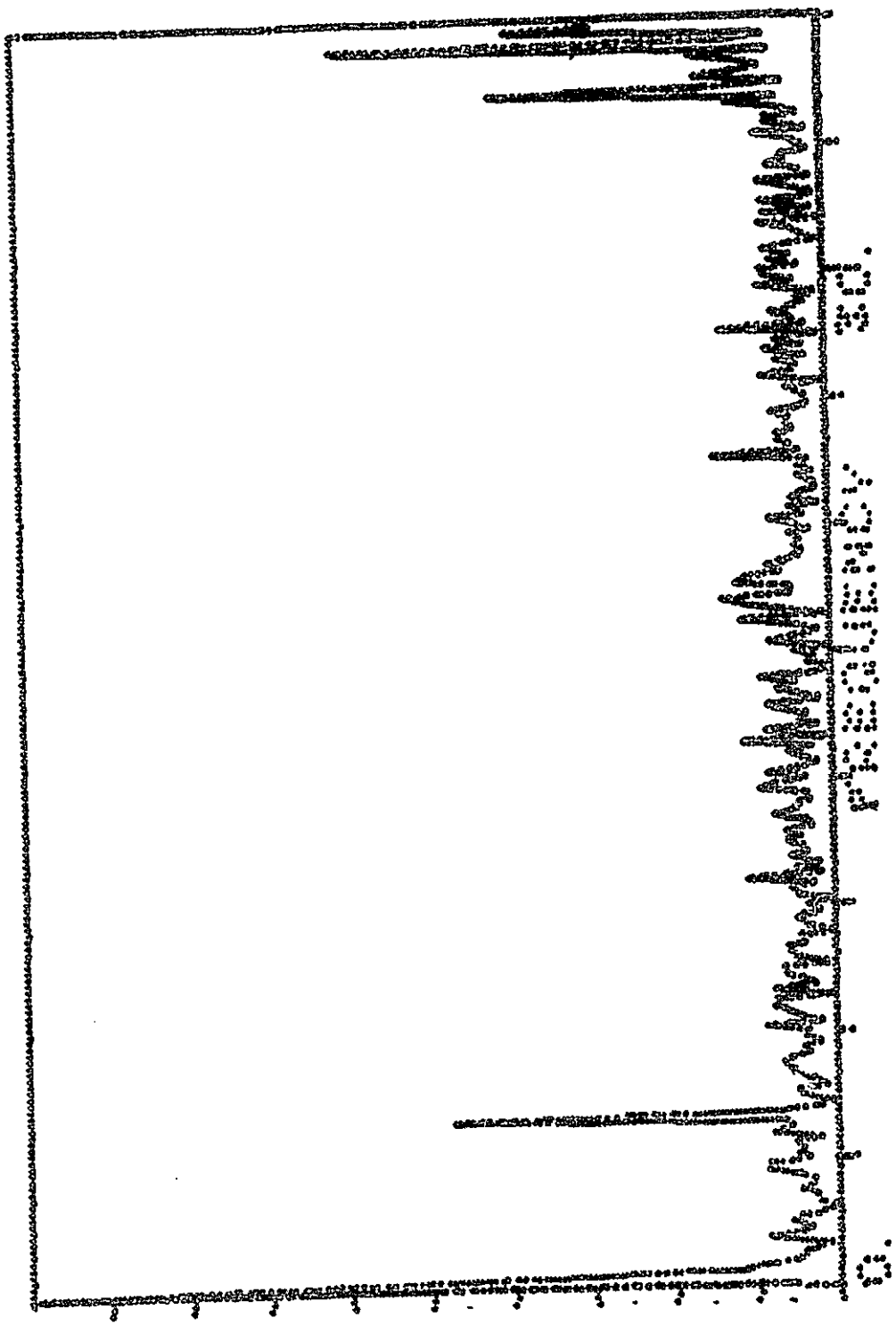
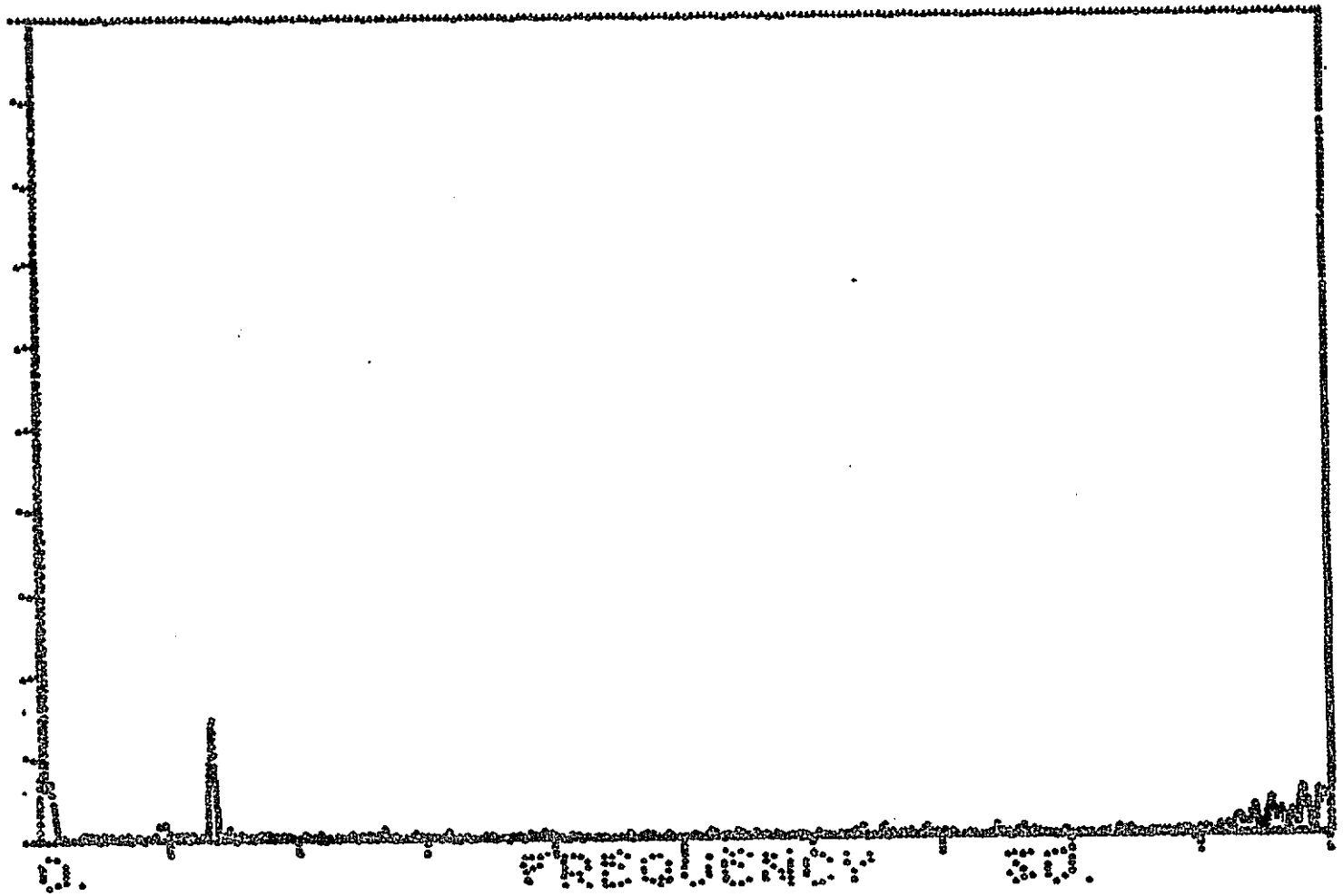
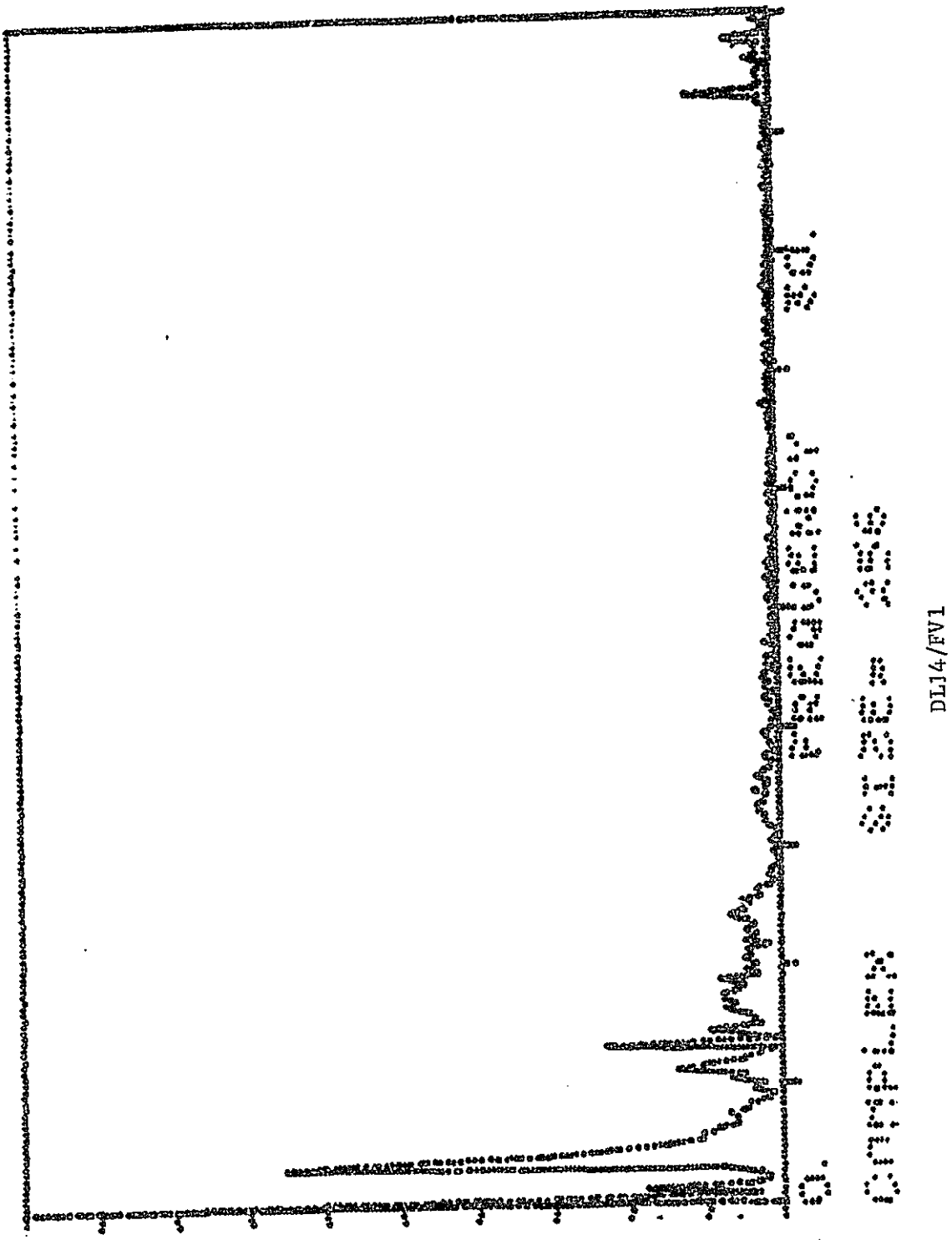


DL12/FV1



DL13/FV1



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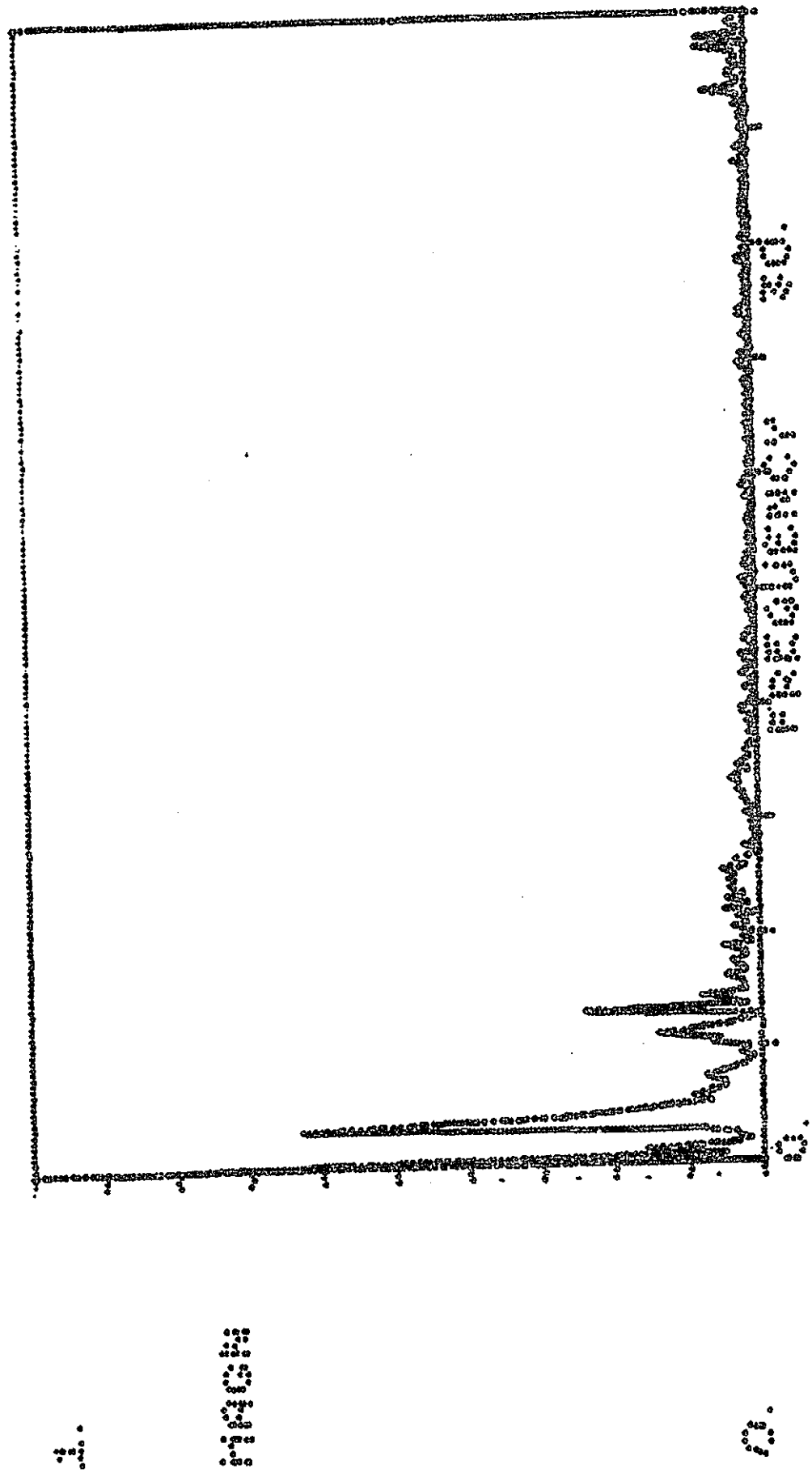
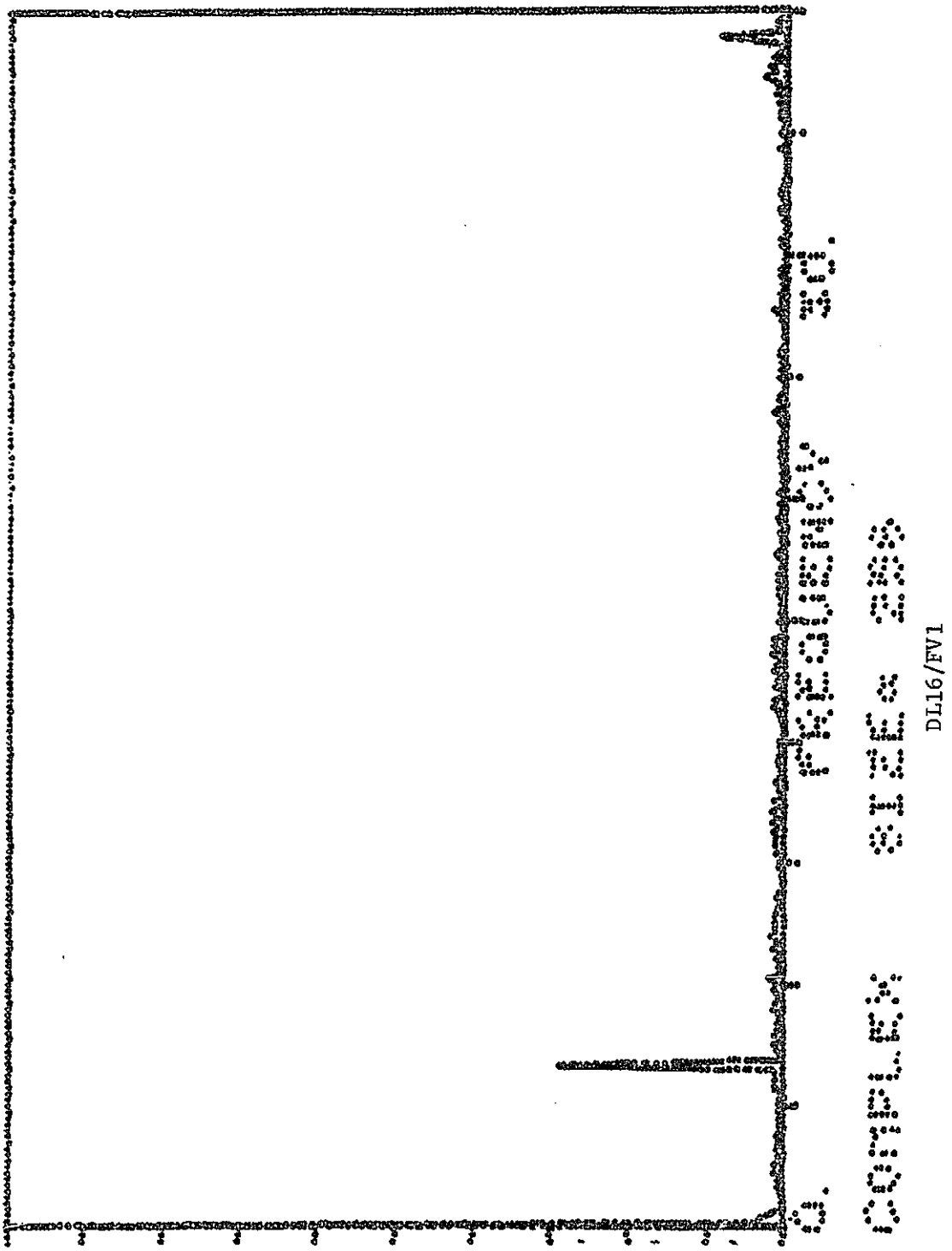
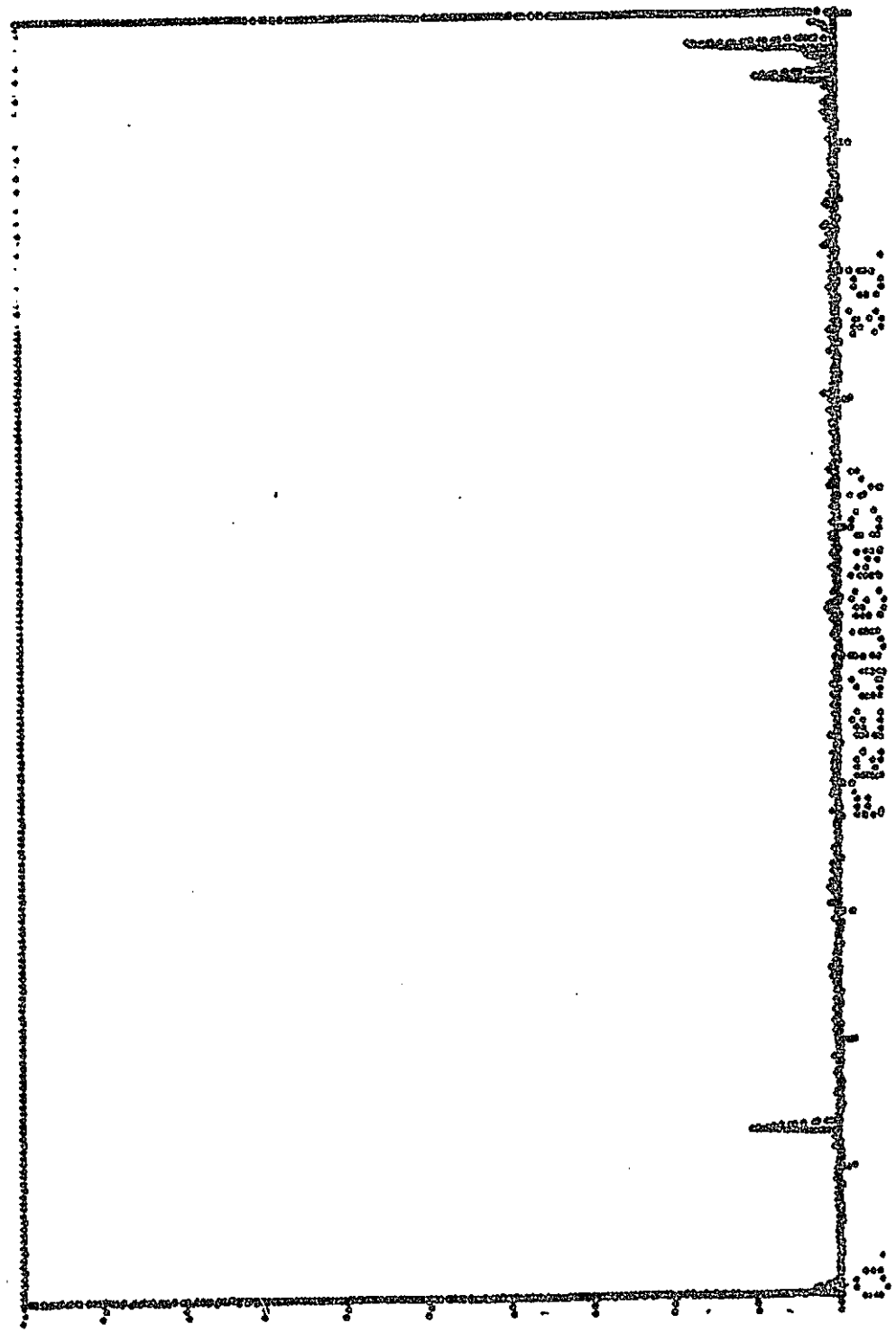


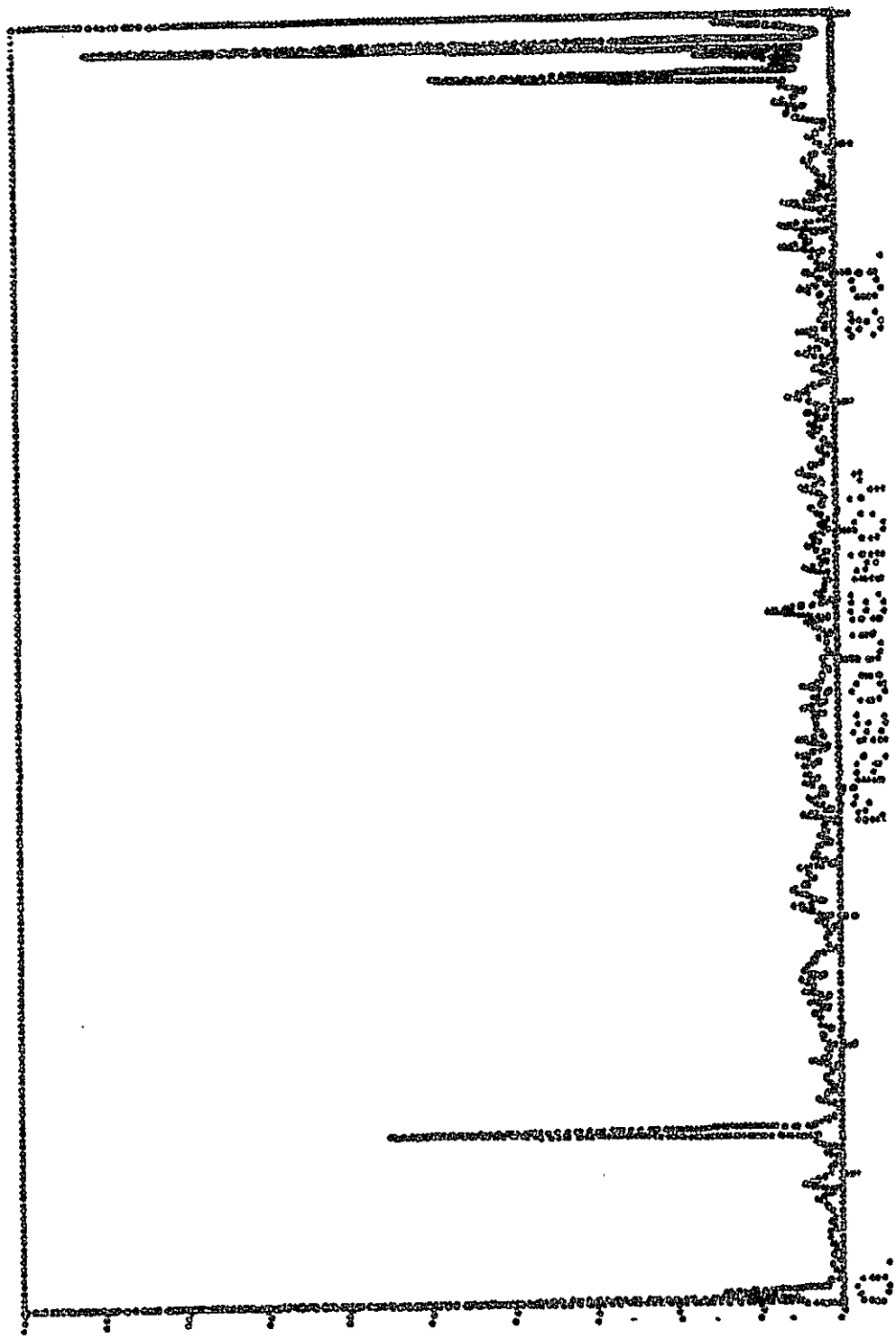
DL15/FV1



DL16/FV1



DL17/FV1



DL17/FV1